GAS JOURNAL

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WELSH DEVELOPMENT

MEMBERS of the Wales and Monmouthshire Association of Gas Engineers and Managers during their recent meeting at Newport had an opportunity to see the modern works which is being erected at Pontypool, expected to start gas-making next year. By co-operation with the General Manager of the Pontypool Gas and Water Company, Mr. J. Powdrill, we are this week able to present a first-hand account of the works and the development of the Pontypool undertaking generally. Looking back on the history of the Pontypool Gas and Water Company one sees how demand was originally steady, increasing only as the undertaking absorbed smaller neighbours. In 1936, however, demand began to climb rapidly. A high proportion of its sales had to be brought from the Blaenavon Coke Oven Company, carburetted water gas plant being installed to enable peak fluctuations in demand to be met. The new works, which is being erected on a site convenient for rail handling of raw materials and by-products, will enable the Company to give a better service to still gas-hungry consumers.

There is another facet of Pontypool's development, however, and one of greater importance in the long view than the immediate satisfaction of the demands of industry in a developing area. This is the facet of the proposed gas grid to cover the Eastern District of South Wales. The proposals for the Western District have already been made public and may be taken as an indication of the way the proposals for the east are likely to work out. The report, however, is already complete and in the hands of the undertakings concerned. Those details of it given in our description of the developments at Pontypool may be taken as authoritative. The scheme is to build up a system of trunk mains, for which Pontypool Gas and Water Company will provide the base load, a task for which its geographical position makes it ideally suited. While work is proceeding busily on the new works (labour scarcities have had to be solved by bringing workers some distance) the job of laying new mains is also proceeding. The ultimate result should facilitate the establishment of light industries with heavy gas consumptions, of which the nylon factory at Pontypool is an excellent example, in an area where in the past the population has been dependent on one or two principal industries for its livelihood.

GAS FOR GLASS

DURING the war years Mr. J. A. Tomes, Deputy Engineer and Manager of the Stourbridge Gas Department, gave a paper to the Midland Junior Gas Association on the use of town gas in the processing of glass tableware. At the time we thought the paper had significance, and in spite of sundry disturbances from enemy action, which shattered a considerable acreage of glass, we published the paper substantially in full, together with a report of a discussion which in effect gave the author "full marks." In our issue to-day we give textually in full a desirable and entirely welcome account of the many steps taken since the bleak months of 1945—and to all-round satisfaction—in the use of gas in the hand-blown domestic glass industry in the Stourbridge area. At the meeting last week of the Midland Association of Gas Engineers and Managers (and it seemed fitting that on this occasion the author should be addressing the senior body in the area) Mr. Tomes embellished his talk by a series of coloured diagrams which unfortunately we could not reproduce in our editorial pages. These diagrams served to add conviction to the purport of the paper, though we think it will be agreed that the paper, as we have presented it, complete with photographic illustrations and our full report of the discussion which it evoked, speaks unmistakeably of what has been done by gas to make good glassware at Stourbridge. The paper in to-day's "JOURNAL" is indicative of the versatility of gas. It is the result of the author's seven years' close contact with a specialized section of the glass industry, made possible—we would emphasize this—by the excellent co-operative conditions existing between the Department and the glass industry when Mr. Tomes first took over his work of expanding the use of gas in this particular field. "To-day," writes Mr. Tomes, "we are looked upon not as a gas department but as friends who are privileged." This atmosphere of mutual trust in common aim must obviously act as a lively incentive to everybody concerned and must be responsible for the exceptional quality of Stourbridge crystal. The industrial section of the Stourbridge Gas Department has, by its keenness in the processes described by the author, helped to cement this co-operation; and it acts as originator and applier of ideas. As a result of the work of the section the glassmaker is convinced that, to achieve his aims, he must regard gas as an ally. This is a fundamental conception which has found root. The possibilities of gas usage in the Stourbridge glass industry amount, at a conservative estimate, to an annual base load of 700 mill. cu. ft. per annum. We feel that these possibilities, of which Mr. Tomes speaks in his paper, will be realized in fact.

COKE MARKETING

"NOTHING is more certain than that we are going to have to sell coke again, instead of rationing it." This was among the views expressed by Mr. J. O. Cooke, General Manager of the London and Counties Coke Association, in a paper last week to the Eastern District of the Southern Association of Gas Engineers and Managers. The general coke market has been substantially created by the foresight and enterprise of the gas industry and can be held for coke only by continuous and energetic development work in the various fields of utilization, by improvement in coke quality, and by efficient consumer service. Part of the paper, which is published, together with our report of the discussion, in our issue to-day, was an outline of the development of organized coke marketing from the formation of the London Coke Committee to the present day; and there will be general agreement with the author that from the view-

point of organization, procedure, and method the industry has built soundly. Irrespective of ownership of the industry the present national and district organization is the best form for the efficient marketing of coke in the future.

Till recently, coke has been in short supply; the art of selling has been temporarily forgotten. Prices are high and quality—because of the deterioration in coal quality—is low. As a result of the restrictions and difficulties of the last nine years some of the users' confidence has been lost. The quantity of gas coke (excluding breeze) produced for sale is of the order of 9 mill. tons a year. About 2½ mill. tons is sold in the industrial market, 4 mill. tons in the small industrial and quasi-domestic markets, 1¾ mill. tons in the domestic market, and the remainder is exported. Half the coke is sold through merchants and factors. Can all these markets be held for gas coke and are any of them capable of expansion? Bearing in mind developments in appliances and equipment now taking place, Mr. Cooke is optimistic, but he rightly maintains that, with the advent of renewed competition, there can be no place for the *laissez faire* attitude. Again, the domestic market is a lucrative one, but it is questionable whether the industry can afford to rely too much on the domestic load. A balance between domestic and industrial markets is one of several problems which will have to be resolved. But all the objectives in the new scheme of things are completely reconcilable with the past work of the Gas Coke Associations. Their aims—improvement of coke quality, continuous development of methods of utilization, first-class consumer advisory service, and a uniform and country-wide marketing structure, are essential to proper distribution of the product and in the best interests of the consumer. And coke will have to be sold in a highly competitive market. Service to the coke consumer will have to be regarded as a first essential. "What we have attempted to do in the past," said Mr. Cooke, "is going to be much more important in the future under the new conditions. In the past the gas coke industry has always had to be flexible in mind and receptive to new ideas, and we have no need to be afraid of the future if we are live to the position. Our steps have been directed to these ends for many years, but we must redouble our efforts if we are to retain our place." The over-riding element is coal quality.

ROYAL VISIT TO BECKTON

H.R.H. the Duchess of Kent will visit the products works of the Gas Light and Coke Company on the afternoon of Nov. 4, when the foundation stone inaugurating reconstruction will be laid. Her Royal Highness will afterwards proceed to the gas-works at Beckton, where she will inaugurate the new coke oven installation. The first two batteries of coke ovens at Beckton were opened by the Duke of Windsor (then Prince of Wales) in 1932.

LOSS ON ELECTRICITY

The theme of many recent speeches to gatherings in the gas industry has been that nationalization having been decided it is up to those at present responsible for the operation of gas undertakings to see that it works. Forging ahead with development plans of a size unparalleled in the history of the industry, many undertakings, as recorded in these columns, seem to be taking this message to heart and are ensuring that an industry in first-class condition will be handed over on vesting day. The general increase in the price of gas decided in recent weeks by so many undertakings suggests that the future Gas Council need not fear a loss in its early operations as has been suffered by the British Electricity Authority. The Electricity Authority, said Lord Citrine, its Chairman, in a recent speech at Edinburgh, faces a loss of between £5 mill. and £7 mill. Something like 150 undertakings were running at a loss and were budgeting for increases at the time of the change-over. The Authority had to face greatly increased capital and operating costs. Compared with pre-war prices, coal had increased by 180%, freight by 93%, and intermediate products by 135%. Some people were paying 1s. per unit and the Authority had reduced those charges to 6d., revising its charges when it was believed to be in the interests of the undertaking and the great mass of its consumers. Lord Citrine foresaw a serious position throughout the country during the ensuing winter. Faced with a grave shortage of plant which the Authority had inherited, demand was 80% more than before the war. The Authority had planned 25 new power stations, but Lord Citrine could not see them "getting out of the wood" before 1953 unless special facilities were given for plant and greater quantities of steel were allocated or exports of electrical plant were cut.

MONEY AND PREFERENCES

Members of the staffs of gas undertakings are always on the look-out for facts and figures which will help them improve the business done by their works. As far as the industrial load is concerned, this is largely a matter of technical progress in adapting plant to gas firing, but where the domestic load is concerned there are more subtle factors of sales policy and psychology to be considered. Some figures which should prove useful are contained in the *Hulton Readership Survey*—1948, published by the Hulton Press, Ltd. This information was obtained early this year by modern sampling methods and the figures quoted represent a cross-section of the population of Great Britain.

Income	Above £650	£400-£600	Below £400
With electricity ..	96%	93%	78%
With gas	81%	80%	77%
With neither ..	3%	2%	5%

In Great Britain there are about 10 mill. households, 65% of which receive both gas and electricity supplies, while 18% have electricity only, and 13% have gas only. This leaves 4% of the households, about 400,000, with no form of supply. The groups in the income grades given are estimated at 1.4 mill. for the "greater than £650" section, 1.9 mill. for the middle section, and 6.6 mill. for the lower income group. The "with neither" class may presumably be taken as referring to isolated dwellings where the high cost of mainlaying leaves a family with little or no option but to work by lamplight and cook over an open fire. In support of this we may quote the figure of £50 estimated by an electricity undertaking for carrying an overhead distribution wire across a 200-yard long field to a house in the north, and an estimate of 12s. to 15s. a yard for a water pipe to be trenched a similar distance (presumably the cost of laying a gas pipe would be similar to the latter figure). Here, then, it seems that there can be little scope for gas development without a reduction in the cost of materials, and in any case the number of families in this class is almost certainly too small to make any difference to the load. What is more serious for the gas industry is the fact that in the highest income group the preference is for electricity. Since this group is for its size one of the largest consumers, here is a matter for serious thought on the part of sales staffs.

WILLINGLY TO SCHOOL

The wisdom of the raising of the school-leaving age, questioned so much at the time of its introduction, has been vindicated by the publication of figures which show that the "extra year" has now ceased to affect recruitment for industry. At the same time, during the period when the lack of young recruits has been most felt, the country's economic rehabilitation has not been obviously affected. Ministry of Labour figures show that more people were placed in jobs by Employment Exchanges during the four weeks ended Sept. 1 than in any similar period since the introduction of the Control of Engagement Order in October, 1947. The figure, 398,000, compares with 305,000 placed in the four weeks ended Aug. 4. During August, the total working population increased by 32,000 (8,000 men and 24,000 women) to 20,297,000, largely the result, as stated above, of school-leavers entering the employment field.

In the manufacturing industries there was an increase during August of 44,000 (30,000 men and 14,000 women). This is almost equal to the total loss in this group since February and again is due to the influx of school-leavers. All the main groups of manufacturing industries showed increases, amounting to over 12,000 in metals and engineering, 7,000 in clothing, and 4,000 in textiles. The number on colliery books fell by 200, there was a fall of 19,000 in the number employed in building and civil engineering, and one of 8,000 in national Government service. Expressed as percentages of the numbers in certain important sections of industry in mid-1939, the numbers employed at the end of August were: Manufacture for home market, 108; manufacture for export, 202;

public service, 152; basic industries, 113; building and civil engineering, 104; and distribution, 82.

During August, four directions were issued under the Order of October, 1947, and in addition four directions were issued to workers normally employed in coalmining, and three to workers normally employed in agriculture, requiring them to remain within their industry. Of the 11 persons thus directed, five men and four women were directed to local employment and two men to jobs away from their homes. This suggests that the Control of Engagement Order is providing a useful check on any drift away from essential industries, but it leaves unanswered the main question of whether its usefulness is sufficient to outweigh its moral unpleasantness. The trouble is that the Government having imposed the check cannot now release it lest there be a general move away from jobs which though unpleasant are most necessary, and in which economic conditions no longer force workers to remain.

Personal

Mr. J. C. MANN, who retired from the Board of the Midland Tar Distillers, Ltd., on Sept. 30, began his career in the tar industry with the Gas Light and Coke Company in 1883, and after subsequent periods with Major & Company, Ltd., of Hull, and Robinson Brothers, Ltd., of West Bromwich, he became General Works Manager of the Midland Tar Distillers, Ltd., in 1921, and held this position till 1938. He became a Director of the Company in 1937. He was a very well-known and popular figure in the industry, particularly in the technical field, and a strong supporter of the various scientific institutions, notably of the Society of Chemical Industry, which he joined in 1891.

Mr. P. R. DAWSON, formerly Deputy Engineer and Manager, has been appointed Engineer and Manager of the Barrow-in-Furness Gas Department in succession to Mr. W. M. GABBATT.

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Mr. A. F. AMES, who retired last month from the position of Engineer and Manager of the Burnley Gas Department, was, together with Mrs. Ames, entertained to dinner by the members of the staff of the Department on Oct. 14. Acknowledging presentations to his wife and himself, Mr. Ames expressed his confidence that the Burnley undertaking would continue under nationalization to serve the community as well as it had done in the past.

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The new Deputy Engineer and Manager of Peterborough Gas Company is Mr. ALAN D. DUXBURY, son of Mr. R. H. Duxbury (South Bank and Normanby), who since his release from the Army has been with the Leeds Gas Department. He held posts before the war at Middlesbrough, Hartlepool, and Stockton-on-Tees. During the war he served in France, Italy, and the Middle East, reaching the rank of Lieutenant-Colonel and being twice mentioned in despatches.

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Mr. J. DAVIS, who has retired from the post of District Manager at Woking, was on Oct. 15 presented with a cheque by Mr. F. A. Cheeseman, Sales Manager, at the Wandsworth headquarters of the Wandsworth and District Gas Company and the Woking District Gas Company, at a gathering representing most stations of the sister companies. Mr. Davis went to Sutton from Wakefield in 1923, and became an official of the Wandsworth Company when amalgamation took place in 1931. In recent years he has been District Manager at Woking.

Obituary

Henry Woodall

No name is held in greater esteem throughout the gas industry—not alone in this country, but on the Continent and in other parts of the world—than that of the Woodall family, and it is therefore with a very real sense of sorrow that we record the bereavement which befell the family in particular and the industry in general by the death, at his home at Mereworth, on Oct. 22, at the age of 81, of Mr. HENRY WOODALL, former Chairman of the Tottenham and District Gas Company, Deputy Governor of the Gas Light and Coke Company, Chairman and Managing Director of the British Gas Light Company, and Chairman of the Danish Gas Company. Since the day well over 60 years ago when he entered the Westminster office of his father, Sir Corbet Woodall, Mr. Woodall had been actively engaged in the gas industry. Trained at Leeds, he travelled extensively in connexion with the work of Corbet Woodall & Son, in which he was first assistant and later partner, supervising the erection and control of gas plant. His firm were consulting engineers to the Imperial Continental Gas Association and at one time were looking after gas-works in Vienna, Amsterdam, Copenhagen, Antwerp, Brussels, and Berlin, to name but a few. Mr. Woodall visited all these cities on his firm's behalf and in addition spent the years 1886-88 in Australia and 1893-95 in South Africa. Corbet Woodall and Son had a large practice in Parliamentary Committee Rooms and Mr. Woodall was frequently called to give evidence when Private Bills were being considered by Lords or Commons. His services were, too, in demand as an arbitrator or as an expert witness in arbitration, and he took part in many important rating cases.

A member of the Institution of Civil Engineers, of the Institution of Gas Engineers, and a Kent magistrate for 37 years, Mr. Woodall joined the Southern Association of Gas Engineers and Managers in 1901, thus being one of its oldest members, and was elected an Honorary Member this year. He joined the Institution in 1892. Shortly after entering into partnership with his father in 1890, Mr. Woodall married Miss Bertha Nettlefold, of Edgbaston, Birmingham. Mrs. Woodall survives her husband. In 1911, he joined the Board of the then Tottenham District Light, Heat, and Power Company, and in 1913 became a Director of the Gas Light and Coke Company, of which his father was then Governor. A "GAS JOURNAL" editorial at the time commented on the value of Sir Corbet being assisted on the Court of Directors by one "at all times in close intercourse" with him and "animated by the same ideals."

On the death of Sir Corbet in 1916, Mr. Henry Woodall filled positions on the Boards of a number of companies formerly held by his father. These included the Croydon Gas Company and the British Gas Light Company: later he was elected to the Board of the Danish Gas Company of which his father had for many years been Chairman. Following the resignation of Mr. R. S. Gardiner, Mr. Woodall became Chairman of the British Gas Light Company in 1919, and in 1926 became President of the British Commercial Gas Association. It was he who in 1921 was responsible for the erection in the Department of Coal Gas and Fuel Industries at Leeds University of experimental gas plant, intended as a memorial to his father. An original Director of the South-Eastern Gas Corporation, he was also on the Boards for many years of the Ipswich Gas Light Company (Chairman) and the Herne Bay Gas and Electricity Company, and was at one time Consulting Engineer to the Houghton-le-Spring Gas Company. As Chairman of the Danish Gas Company, a position he resigned early in 1947 for reasons of ill-health, he was mainly responsible for the restoration of the organization on its original footing after the war, which had brought a complete break-up of the internal structure of the Company. He resigned from the position of Deputy-Governor and from the Court of Directors of the Gas Light and Coke Company in December, 1946, and from the Board of the South-Eastern Gas Corporation in the same year.

The Woodall family has a connexion with several gas companies unbroken since 1883, when Sir Corbet Woodall became a Director of the Tottenham and District Gas Company, becoming Chairman in 1897. Mr. Henry Woodall became Chairman in 1922, and was Managing Director from 1928 until 1946 when he retired, though remaining on the Board. Thus a member of the Woodall family has held the Chairmanship continuously except for a period between 1916 and 1922. The present Chairman and Managing Director is Mr. Henry Woodall's son, Mr. Edward C. Woodall.

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George S. Eunson

A family record of 103 years' service to the Northampton Gaslight Company was broken by the death on Oct. 22, at the age of 82, of Lieut.-Colonel GEORGE SOMES EUNSON, who, although he retired from his official position earlier this year, continued to take an interest in its affairs. In 1845 Colonel Eunson's grandfather was appointed Consulting Engineer to the Company, he being at that time the Engineer of the Wolverhampton Gas Company, with an extensive private practice. In 1854 Mr. John Eunson (Colonel Eunson's father) was appointed Engineer, and held the office until his death in 1911. Educated at Northampton Grammar School and Edinburgh University, Colonel Eunson joined the Company as a pupil under his father

in 1883, was appointed Assistant Manager in 1888, and on the death of his father he was appointed Chief Engineer. He became Managing Director in 1936, and Chairman in 1944.

Colonel Eunson retired from the Chairmanship of the Company in May, after having completed 65 years' continuous service, and the office of Manager was then filled by the appointment of Mr. H. Banks, who, like himself, had been a pupil of Mr. John Eunson and had for some years occupied the post of Chief Engineer. Presentations from the Directors and staff of the Company were made to Colonel and Mrs. Eunson on the occasion of their golden wedding three years ago.

Colonel Eunson had many interests outside the gas industry. In 1884 he visited Canada and the United States with his brother for the meeting of the British Association, and in 1889 he visited the volcanoes of Southern Italy with the Geologists' Association, and was the first known Northamptonian to ascend Mount Etna. He joined the Northampton Volunteers in 1889 and continued with the Territorial Army until he retired in 1919. On the outbreak of the 1914 war he took charge of the Territorial Depot; he raised the 3/4 Battalion and was appointed to the Command in 1915. He was promoted to the rank of Lieut.-Colonel in 1916. He was a member of the Territorial Army Association from its formation in 1908 and retired in 1947. He also took a keen interest in the training of boys and commanded the Northampton Church Lads Brigade for 30 years. Colonel Eunson had a distinguished record in Freemasonry, which he entered 51 years ago. He was President of the Midland Association of Gas Engineers and Managers in 1936.

The funeral was at All Saints Church, Northampton, on Monday followed by cremation at Milton.

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Robert J. Meiklejohn

It was with deep regret that the members of the Midland Association of Gas Engineers and Managers learnt at their meeting at Birmingham on Oct. 21 that Mr. ROBERT JAMES MEIKLEJOHN, Engineer, Manager, and Secretary of the Rugby Gas Company, who had been a member of the Association for very many years, had died early that morning at the home of his brother, Mr. Charles Meiklejohn, in Rugby, a few hours after being brought home from the Queen Elizabeth Hospital, Birmingham, where he had been a patient for six weeks. Mr. Meiklejohn, who was 65, entered the service of the Rugby Gas Company under his uncle, Mr. C. Meiklejohn, in 1901, and was appointed Manager on the death of his uncle in 1914. To his duties as Engineer and Manager were added those of Secretary in 1930, and in 1944 he was elected to a seat on the Board.

He was the eldest son of Mr. John Meiklejohn, who was Manager of the old Aldershot Gas Company prior to 1901 and Manager of the Yorktown and Camberley Gas Company from 1901 to 1908. There are four surviving brothers. Although Mr. Meiklejohn had been a member of the Midland Association for 24 years he had never accepted any of the principal offices in the Association, though he was always ready to render assistance to his colleagues. He was also a member of the Midland Regional Joint Industrial Council for the Gas Industry, and President of the Rugby Company's Sports Club. Under his supervision the Rugby works was completely modernized; new showrooms were opened in 1933, and a new distribution department is to be opened shortly. Within the past year the Company has started to receive a bulk supply of gas from Coventry to help in meeting the growing needs of the district.

Apart from his professional interests, Mr. Meiklejohn was very well known in Freemasonry, as mentioned in the following appreciation from Mr. R. J. Rogers. He was also a keen golfer, and had been President of the Rugby Golf Club.

The funeral at Holy Trinity Church, Rugby, on Monday, was followed by cremation.

Mr. R. J. ROGERS writes: The passing of R. J. Meiklejohn will be deplored by a large number of people not only in Rugby and the Midlands but in many other districts in the country where he was well known and universally respected. My friendship with "Bob" Meiklejohn goes back nearly 40 years when we were associated in the early days of the Midland Junior Gas Association. My appreciation of his sterling character and lovable disposition has been strengthened with the passage of time, and I know has been shared by all those who were privileged to be counted in his circle of friends.

He had occupied the position of Engineer and Manager of the Rugby Gas Company for 34 years, having succeeded his uncle Charles Meiklejohn in 1914. Under his capable guidance the Company developed in its service to the domestic and industrial gas consumers in Rugby; the consumption of gas increased from an output in 1914 of 186 mill. cu.ft. to 619 mill. cu.ft. at the present time. Appreciation of his loyal services to the Company was shown by his appointment to the Board of Directors. A regular supporter of the Institution of Gas Engineers and the Midland Association of Gas Engineers and Managers, "Bob" Meiklejohn never sought any office. He shunned publicity, but was always ready and willing to give a helping hand and assistance to any of his fellow gas engineers.

He was an enthusiastic Freemason; a Past Master and for many years Secretary of the Murdoch Lodge; a Past Provincial Grand Warden for Warwickshire; a member of the Evening Star Chapter; and, since 1946, a Past Grand Standard Bearer. The efficient and painstaking manner in which he carried out all his duties, professionally and masonically, will remain for ever a proud tribute to his memory and an incentive to those who must carry on in his stead. His unassuming disposition was characteristic of him, and, coupled with his charming manner and sincerity, endeared him to all those with whom he came into contact.

To those who knew him best he was a delightful companion, and many will long remember the happy hours spent with him on golf course, in the club, and in other social circles. To those nearest and dearest to him, whom he has left, will be extended the sincere sympathy of all who knew him.

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The death occurred on Sept. 26 of Mr. HARRY HOWARD LANGFORD at his home, 86, Devonshire Road, Weston-super-Mare. Mr. Langford was the representative of Richmonds Gas Stove Company, Ltd., in the south west of England from 1921 until his retirement in December, 1944, from which date he was overseer of the meter factory of George Glover & Co., Ltd., at Cardiff. Before 1921 he was employed by the Cardiff Gas Light and Coke Company.

Diary

Oct. 28.—**Solid Smokeless Fuels Federation**: Executive Committee, Dorchester Hotel, Park Lane, W.1, 11.30 a.m.

Oct. 29.—**Coke Oven Managers' Association**: Annual Dinner, Waldorf Hotel, London, W.C.2, 7 p.m.

Oct. 29.—**Manchester District Association of Gas Engineers**: Autumn Meeting, Hotel Majestic, Harrogate.

Oct. 29.—**London and Southern Junior Gas Association**: "The Preservation of Gas-works Structures by Paint," L. A. Ravald, M.Sc.(Tech.), A.R.I.C., Gas Light and Coke Company. Gas Industry House, 7 p.m.

Nov. 2.—**Midland Junior Gas Association**: "Coals for the Midland Gas Undertakings," F. C. Barker, M.Inst.Gas E., Birmingham Gas Department, 6.30 p.m.

Nov. 2.—**National Federation of Gas Coke Associations**: National Technical Committee, Coventry Gas Department, Gas Street, Coventry.

Nov. 3.—**Manchester and District Junior Association of Gas Engineers**: Morning—Visit to Sutcliffe Speakman & Co., Ltd., Leigh; afternoon—Visit to Rochdale Corporation Gas Department. "Coke and Breeze Briquetting," Mr. Bardsley (Sutcliffe Speakman & Co., Ltd.).

Nov. 6.—**Institution of Chemical Engineers (North-Western Branch)** and **Chemical Engineering Group**: Joint Meeting. "The Cooling of Circulating Water for Coolers and Condensers," J. Leyland, M.Sc., M.I.Mech.E., A.M.I.Chem.E. Reynolds Hall, College of Technology, Manchester, 3 p.m.

Nov. 8.—**London and Counties Coke Association**: Technical Committee, 2.30 p.m., Gas Industry House.

Nov. 8.—**Women's Gas Council**: Executive Meeting, Gas Industry House, 1 p.m.

Nov. 8-9.—**Women's Gas Council**: Conference for Branch Secretaries Gas Industry House.

Nov. 9.—**National Federation of Gas Coke Associations**: General Committee, 10 a.m., Gas Industry House.

Nov. 9.—**Federation of Gas Employers**: Central Committee, Gas Industry House, 11.30 a.m.

Nov. 9.—**British Gas Council**: Central Board, Gas Industry House, 2.30 p.m.

Nov. 9.—**Chemical Engineering Group (Society of Chemical Industry)**: "Heat Transfer," A. D. Davidson, Geological Society Rooms, Burlington House, Piccadilly, 5.30 p.m.

Nov. 10.—**Eastern Junior Gas Association**: Visit to Ascot Gas Water Heaters, Ltd., Neasden.

Nov. 10.—**Domestic Development Committee**: Technical Sub-Committee, Gas Industry House, 10.30 a.m. Meeting of Domestic Development Committee, 2 p.m.

Nov. 12.—**Eastern Association of Gas Engineers and Managers**: Autumn Meeting, Waldorf Hotel, Aldwych, London, 2.15 p.m., preceded by luncheon at 12.30 for 12.45 p.m.

Nov. 15.—**London and Counties Coke Association**: Annual Luncheon, 1 p.m. for 1.15 p.m.; Annual General Meeting, 2.45 p.m. Grosvenor House, Park Lane, W.1.

Nov. 16.—**Institution of Chemical Engineers**: "Chemical Plant Design for Ease of Cleaning," J. Matthews, B.Sc., A.R.C.S., Geological Society Rooms, Burlington House, Piccadilly, 5.30 p.m.

Nov. 18.—**Midland Junior Gas Association**: Visit to Henry Wiggin & Co., Ltd., Birmingham, 4.30 a.m.

Nov. 19.—**Institution of Chemical Engineers**: "Extractive Distillation," Professor F. H. Garner, O.B.E. English Theatre, University of Birmingham, Edmund Street, 4.30 p.m.

Nov. 24-25.—**Institution of Gas Engineers**: 14th Autumn Research Meeting, London.

L.C.C. VOTES FOR DISTRICT HEATING

POWER SOUGHT TO ESTABLISH HEAT UNDERTAKINGS

LONDON COUNTY COUNCIL is to make a second attempt to obtain powers from Parliament to establish heating undertakings to supply heat and hot water to its housing estates, notwithstanding strong opposition to the original scheme for district heating when it came before Parliament last year. On Oct. 19 a resolution that the Council should promote legislation in the 1948-49 session of Parliament was put to the Council by the Housing Committee and was passed without discussion or dissent. The General Purposes Committee, it is stated, had agreed to the matter being treated as one of urgency because of the great amount of work and preparation involved in a Private Bill. It is unlikely, however, that any detailed scheme will be published for 12 months, possibly 18 months.

The resolution adopted stated: "That legislation be promoted by the Council in the session of Parliament of 1948-49 (*a*) to empower the Council and the Metropolitan Borough Councils (i) to establish heating undertakings for the purpose of supplying heat and hot water to houses and other buildings provided or managed by them in the exercise of their housing functions under the Housing Act, 1936, and other enactments, or provided by, or sold or leased to, other persons in or in connexion with the exercise of such functions; (ii) to include within the scope of any heating undertaking so established other premises that may conveniently be so included or that it is desirable to include for the benefit of the undertakings; and (iii) to supply heat and hot water to any such houses and other buildings and premises as aforesaid which may be included within the scope of a heating undertaking; (*b*) to provide for defining the areas outside the Administrative County of London in which the Council may establish heating undertakings and supply heat and hot water as aforesaid; and (*c*) to make provision for incidental and consequential matters."

Report on Proposals

A report to the Council accompanying the resolution explains the scope of the proposed powers, which it will be seen are very wide.

Principally, the Council will seek a general power to establish "any number" of heating undertakings to supply heat and hot water to its housing estates. The powers would be confined to the "heating limits" except that the authority would be empowered to go outside those limits for the purpose of obtaining a supply of heat, for example, from an electricity generating station. In the case of a Metropolitan Borough Council the "heating limits" would be the borough, and in the case of the Council the county and any area outside the county where housing operations were carried out. In the latter case the area would be defined by agreement between the L.C.C. and the local authority concerned, or in default of such an agreement by the Minister of Health.

The category of premises in connexion with which an undertaking might be established will be widely defined so as to include all premises provided by the authority in connexion with its housing operations (whether under the Housing Act, 1936, earlier Housing Acts, or in respect of rehousing obligations arising from the execution of improvements, and the like); and all premises in the provision of which the Council or a Metropolitan Borough Council has been interested as housing authorities, except where their sole interest was that of having advanced money, such as premises erected by others on land sold or leased for purposes ancillary to the development of an estate, and houses provided by a housing association in pursuance of arrangements made with a housing authority.

Though a heating undertaking will not be established other than for the primary purpose of supplying heat and hot water to the kinds of premises indicated above, the authority would be allowed to include within the scope of an undertaking other premises in the neighbourhood where they could be included without detriment to the supply of heat to a housing estate and without unreasonable extra cost, or which it was desirable to include for reasons of economy. An example of premises in this last category are those in Dolphin Square included in the Westminster heating scheme already approved.

To meet the views of the Ministry of Health with respect to water supply, and partly to remove any apprehensions as to the risk of the establishment of an undertaking of abnormal scope, it is proposed that the Minister of Health be asked to approve the establishment of an undertaking, with powers to prohibit but not to direct the inclusion of particular premises within the scope of the undertaking. This is in line with the provisions which the Council was obliged to insert in the 1946-47 Bill in connexion with the Westminster scheme.

On that most debatable point, the economics of district heating, the proposed scheme will provide for separate accounts of heating undertakings to be kept and charges to be adjusted so as to make them self-supporting "as far as reasonably practicable." The Council or a Metropolitan Borough Council would, however, have powers to combine undertakings for the purpose of accounts and charges, and the Minister of Health would be empowered to authorize the carrying of income and expenditure into the statutory housing accounts "where this was not open to objection."

The breaking up of streets outside the county, including the breaking up of a street by a Metropolitan Borough Council for the purpose of obtaining a supply of heat from a place outside the County of London, would be subject to the consent of the highway authority, but this consent is not to be unreasonably withheld.

These are the broad aims of the Council in its proposed Bill. They are stated to be "in general terms, subject to reasonable limitations, and, in relation to areas outside the Administrative County, restricted in scope."

Reviewing the history of its district heating proposals, the Housing Committee's report says that the Council in February last year decided to promote legislation in the 1946-47 session of Parliament to confer on Westminster City Council powers to enable it to provide a supply of heat and hot water to certain premises in Westminster, and on the Council and Metropolitan Borough Councils powers to enable them to supply heat and hot water to any persons for whom they provided housing accommodation under the Housing Acts, 1936 to 1946. So far as the L.C.C. was concerned, accommodation provided outside London was to be included. Seventeen petitions were deposited in the House of Lords against the proposals and, in view of the formidable nature of the opposition, the scheme was withdrawn except so far as it related to the particular housing scheme in the City of Westminster. These limited proposals were strenuously opposed by electricity, gas, and water undertakings but eventually passed into law, subject to a number of amendments and additional provisions.

Arguing the case for district heating, the report says that the distribution of heat may be made from sources such as electricity generating stations where heat otherwise wasted could be used, or from a central source specially provided. In the final report of the New Towns Committee mention was made that district heating might play a great part in economizing in coal while improving standards of heating and reducing smoke nuisance. The Ministry of Health and the Ministry of Fuel and Power are said to be encouraging local authorities to proceed with plans for the installation of district heating schemes and it has been stated in the House of Commons "more than once" that Governmental legislation to supplement the existing powers of local authorities is under consideration but "it is understood that there is no prospect of such legislation being introduced in the near future." The Committee has been advised that whatever the precise powers of local authorities under existing Acts, they do not allow the inclusion of a heating supply to premises erected by others than the housing authority on land sold or leased by the authority.

Framed Narrowly

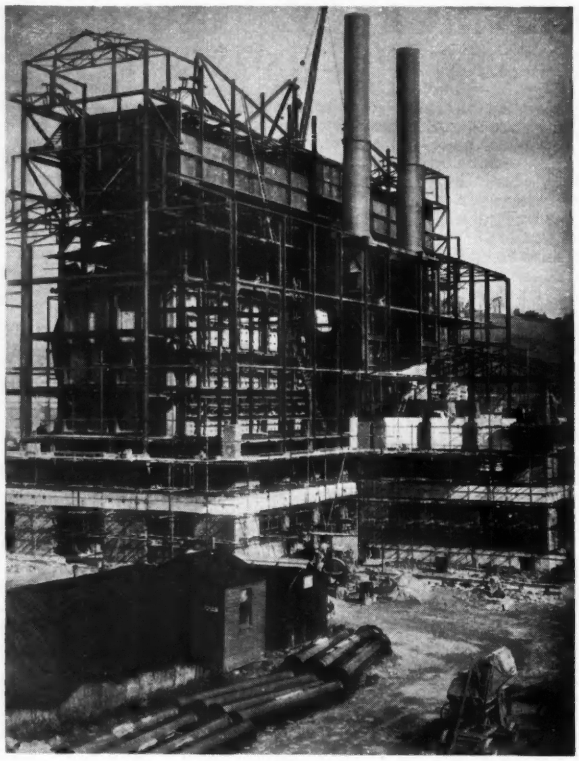
The Council's proposals in the Parliamentary session of 1946-47 were introduced into its General Powers Bill as late clauses, and on that account were framed more narrowly than might otherwise have been the case. They were limited so as to empower the Council and Metropolitan Borough Councils to supply heat and hot water to such buildings as were provided either alone or jointly with an other person under the Housing Act, 1936, Part V. This would have excluded many premises which it might have been desirable to include in a heating scheme, such as shops and other buildings on land acquired by the Councils for housing and leased or sold for development by others. This limitation of the powers did not appear to have lessened the opposition to them and the powers obtained in respect of Westminster allow the City Council to supply heat by means of hot water, but not hot water itself, to any premises in specified areas, the heat being obtained from Battersea Power Station. In addition to including provisions to protect electricity, gas, and water undertakings, the Select Committee also modified the clauses requiring the City Council to keep separate accounts instead of carrying its receipts and expenditure into its housing accounts as proposed, and, before going ahead with any works, to submit to the Minister of Health for approval particulars for the works.

In the new scheme, the Housing Committee states, protective provisions for electricity, gas, and water authorities will be required on the lines of those included in the Westminster provisions in the General Powers Act, 1947, and in recent Acts conferring heating powers on certain local authorities in the provinces. A feature of these Acts is that where the British Electricity Authority is able to provide on reasonable terms any supply of heat required by the local authority, the authority must take the supply for the district heating scheme instead of building its own heating station, subject to the decision of the Minister of Health. No question of Government grant is involved, the report states.

The Ministry of Health and the Ministry of Fuel and Power, it is understood, have recently approved 20 local projects on a semi-experimental basis. About a dozen have been selected for early development, chosen on a climatic basis so that economic conclusions can be reached about the relative demand in the warmer and colder parts of the country.

PONTYPOOL GAS DEVELOPMENT

TO PROVIDE BASE LOAD FOR SOUTH WALES EASTERN GRID



The continuous vertical retort plant which is being installed by the Woodall-Duckham Company for the Pontypool Gas and Water Company, in process of construction. Unusual features are to be band conveyors for coke and coal. The installation comprises 36 retorts, lambent heated.

IMPORTANT developments in the gas supply to the Eastern District of South Wales are being based on Pontypool, Monmouthshire, which is strategically and economically well-placed for the task. There an entirely new works, modern in every detail, is being built for the Pontypool Gas and Water Company on a 12-acre site close to the rail junction.

Pontypool's new works have to be considered in relation to the development of the undertaking itself—in the last 15 years demand has been rapidly overtaking supply—and in relation to the future developments of gas supply through the proposed Welsh gas grid. The Report of the Working Party for the Eastern District of South Wales has not yet been made public, but it is complete and in the hands of the undertakings concerned.

Pontypool Gas and Water Company was formed in 1850. To-day it supplies an area of 85 sq. miles, with a population of about 81,000, through 110 miles of mains. There are 14,000 gas consumers in the area, including a number of heavy industrial consumers. Last year's output of gas was 830 mill. cu.ft., made up of 570 mill. cu.ft. of coke oven gas received from Blaenavon Coke Oven Company, 150 mill. cu.ft. of coal gas, and 108 mill. cu.ft. of carburetted water-gas.

It was not until about 1936 that demand on the Pontypool Gas and Water Company's gas resources became heavy. Until then the increase had been small and steady, being made up principally by the absorption of neighbouring small undertakings. In 1936 the demand for gas began to move upwards in leaps and bounds, so much so that when the war came with its even heavier demands, the requests for more and yet more gas became an embarrassment rather than a source of joy to the Company. The following table shows how the demand moved:

	Mill. cu.ft.		Mill. cu.ft.
1936	217	1942	518
1937	341	1943	583
1938	332	1944	665
1939	369	1945	677
1940	401	1946	775
1941	460	1947	830

The present rate of increasing gas consumption amounts to more than 100 mill. cu.ft. per annum.

Smaller companies which have been absorbed by the Pontypool undertaking include the following: Abersychan Gas Company, by Special Order, August, 1921; Cwmbran and Pontnewydd Gas Company, by Special Order, 1936; Usk Gas Company and Blaenavon Gas and Water Company, by Special Order, 1937. Gas has been supplied to the Blaina Gas Company since 1935.

The Company's area of supply now includes the Urban Districts of Blaenavon, Cwmbran, Pontypool and Usk, and parts of the Rural Districts of Monmouth and Pontypool. In addition to its own area, the Company supplies gas in bulk to Abercarn Urban District Gas Department, and Brynmawr and Blaina Gas Company.

Increasing demand for gas from Pontypool, growing so quickly that the plant could not keep pace with it, has been the reason why such a large proportion of its supplies has had to be made up of coke oven gas. The present plant at the Company's works consists of 32 horizontal retorts in four beds of eight, with a capacity of 0.5 mill. cu.ft. per day, and four Humphreys and Glasgow carburetted water-gas plants, each making about 0.5 mill. cu.ft. of gas per day. The reason for the relatively large amount of C.W.G. plant being installed was to enable peak demands and fluctuating coke oven gas supplies to be quickly balanced to meet district gas consumption.

With the area around Pontypool scheduled for industrial development and a consequent further increase in the demand for gas to be expected, immediate development of gas-making capacity has become imperative. Last year, sales of gas to industrial consumers, including steel works, engineering works, bakeries and biscuit works, which all have large demands, totalled 167 mill. cu.ft. A very large nylon spinning factory, the sole producer of nylon yarn in Great Britain, now coming into production in the Company's area of supply, will be its largest consumer, taking up to a maximum of 1 mill. cu.ft. per day.

The Working Party set up for the eastern area of South Wales has recommended that Pontypool should provide base load gas into the grid supply, amounting to a total quantity of 5 mill. cu.ft. per day, developing over a period of 20 years in three stages: Initial development, 1950-53; interim development, 1960; and long-term development, 1970. Pontypool is perfectly placed to provide this load, being situated at the centre of the Eastern and Western Valleys of Monmouthshire, on the main road to Abergavenny, and lying half-way between Newport and Blaenavon. With its water interests, the Company is able to facilitate mainlaying by using the same trenches.

Work on New Plant

To meet the new demands, work has been in progress for two years on a new gas-works, laid out on a site chosen to facilitate delivery of coal for carbonizing, and the disposal of by-products. The 12-acre site is near the Pontypool Road Station and sidings (a junction), and while the capacity of the works now being built will be 4 mill. cu.ft. per day, provision has been made for development up to 12 mill. cu.ft. a day capacity without any shut-down, both on the carbonizing and by-products sides.

The carbonizing plant, together with the coal handling and coke handling and screening plant is being built by the Woodall-Duckham Company, and will comprise 36 continuous vertical retorts of the 82 in. major axis size with lambent heating. They will be arranged in two benches of 18, the design being such that any individual retort can be controlled independently of the remainder. Two waste-heat boilers of the horizontal fire-tube induced draught type will be provided in an annexe at one side of the retort house.

Coal supply to the retorts will be brought in wagons to the sidings where a side-discharge tippler will be arranged for handling wagons up to 20 tons net load. By means of the tippler, coal will be discharged into a receiving hopper at one side of the specially-laid railway track. From the hopper coal will be fed by means of a rotary feeder on to an inclined band conveyor which will deliver the coal into a single-roll coal breaker. The breaker will be fitted with a by-pass chute complete with a bar screen to enable smalls to by-pass the breaker.

From the delivery chute beneath the breaker, the small and broken coal will be passed on to an inclined band conveyor feeding a transfer station. From this point a further conveyor will elevate the coal to a second transfer station at the side of the retort house at approximately

top-of-hopper level. A cross-band conveyor will then carry it into the retort house and discharge it on a shuttle-band conveyor which will distribute the coal throughout the overhead coal storage hoppers above the retort benches.

Coke from the retorts will be discharged into a hand-propelled travelling coke chute which will feed on to a band conveyor carried in a trench beneath the retort benches. This conveyor will take the coke to a point outside the retort house, and from this point four inclined band conveyors will be provided for elevating the coke to a level above the retort benches. Two of these conveyors will be utilized for elevating either coal or coke.

The coke screening and storage plant will comprise bunkers with a total capacity of 400 tons. Two 20 tons per hour coke cutters will operate in conjunction with each screening unit, each of which will comprise a scalping screen and grading screen to produce four grades of coke, 0-¾ in., ¾-1¼ in., 1¼-2 in. and over 2 in. The coke bunkers will be fitted with bottom outlets complete with discharge chutes, for loading into road vehicles on one side and rail wagons on the other. The chutes will be fitted with debreezing units. Coke to the producers will be weighed before charging.

The layout of the retort house has been arranged to fit in with eventual development plans, so that the vertical retort installation can be extended at the south end of the plant now being erected.

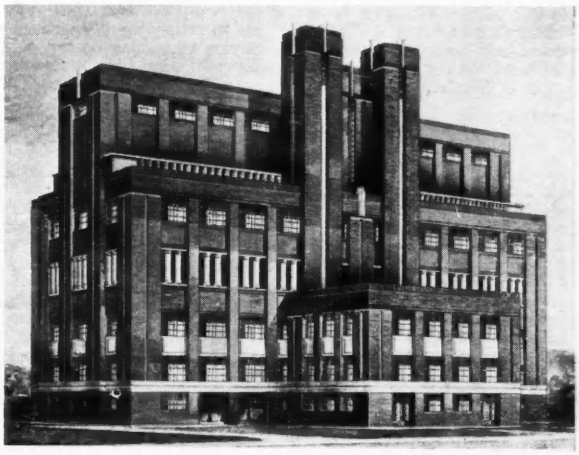
Crude gas will cross the main road running through the works and will be distributed through the by-product plant which will consist of a 4 mill. cu.ft. per day vertical water-tube condenser, a 4 mill. cu.ft. per day electrostatic detarrer, Livesey washer, and static washer. As with the carbonizing plant, the by-product line has been arranged so that branches are left for a further two lines to be erected without any necessity for a shut-down.

The purifiers are of a normal oxide purification type and consist of five boxes of 176 ft. total length. Rail access is being provided to the purifiers and to the Lancashire boiler house, which is to include two 30 ft. by 8 ft. Lancashire boilers with the necessary pumping plant and works tar pumps.

Architectural Features

The works meter will be of Holmes-Connersville design with a 6 mill. cu.ft. capacity, the foundations being arranged so that a 10 mill. cu.ft. per day meter can be installed without any modification. The main holder, which is being erected by R. & J. Dempster, Ltd., has a capacity of 1½ mill. cu.ft., is spiral guided, and has three lifts.

De-dusting equipment is being provided in the retort house, above the waste-heat boilers which are at ground level. The house itself is being built in sand-faced multi-coloured bricks and will be of a total height of 110 ft., including the chimneys, which are to be enclosed in brick towers. The architectural features of the building will be enhanced by white pointing running along the horizontal joints of the brick-work, some vertical white bands with string courses and panels of artificial stone. Great care has been taken to ensure that all the works buildings will be harmoniously and architecturally in keeping with the retort house, which being the largest building rightly forms the central feature of the site.



An artist's impression of the completed retort house building. Total height, including the brick-enclosed chimneys, is 110 ft. An architectural feature is the brick structure contrasting with white panels and pointing.

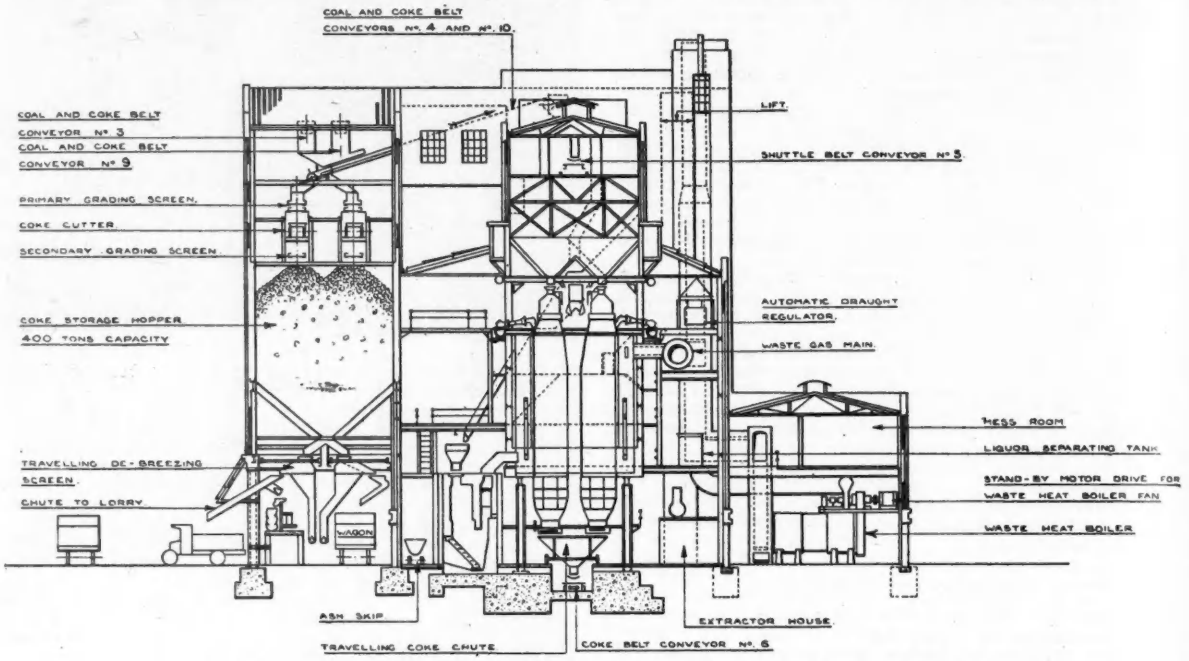
On each side of the main road into the works, an administrative building, of modern architectural design, is to be erected, each 194 ft. long by 30 ft. wide. In them will be housed the technical staff, laboratories, transport, and carpenters' and painters' workshops. Thus large and well-fitted offices for the technical and works' managerial staff have been provided.

In the engine house, built again in the same style as the retort house, there will be two Holmes-Connersville exhausters dealing with 200,000 cu.ft. of gas per hour, driven by two Belliss and Morcom steam engines. Two compressors will send the gas to outlying districts; each will have a capacity of 150,000 cu.ft. per hour against a pressure of 15 lb. per sq. in. They will be supplied by the Bryan Donkin Company, Ltd. Electricity will be generated on the site by a Bellis and Morcom two-crank steam engine directly coupled to a 250 kVA. alternator of 50 cycles 450 volts. The steam engines are of the compound type exhausting with a back pressure of 30 lb. per sq. in., which will be utilized for retort steaming and process work.

While work is thus in progress on the site of the new works—to solve labour difficulties men have had to be brought some distance to carry the project through—the job of laying new mains is proceeding with the aim of building up a trunk line to cover the area from Newport and Abergavenny in the east to Brynmawr in the north, and Abercarn in the west.

General view of the Pontypool Gas and Water Company's new works. The partly-built holder is in the background.

In this way, work which is serving the Pontypool Gas and Water Company's own needs if it is to be able to satisfy a still increasing demand in a developing area is also serving what may be expected to be the plans for the long-term development of gas in the Eastern District of South Wales. This long-term plan, already well launched though the proposals of the Working Party have yet to be made public, provides wide gas coverage of an important area. With adequate supplies of gas from the proposed grid, Eastern Wales will all the more easily attract the light industries, such as the nylon factory at Pontypool, which are needed to balance its economy.



A cross-section of the vertical installation at Pontypool, showing the belt conveyor system.

MIDLAND ASSOCIATION

The Autumn General Meeting of the Midland Association of Gas Engineers and Managers was held at the Queen's Hotel, Birmingham, on Oct. 21, under the presidency of Mr. S. J. D. Williams (Stourbridge). Before proceeding with the business, the **President** said it was with much regret that he had to inform the members of the passing of Mr. R. J. Meiklejohn, Engineer, Manager, and Secretary of the Rugby Gas Company. He had been a member of the Association for, he believed, 24 years, and he was a gentleman the Association in particular and the gas industry in general could ill afford to lose. He was highly esteemed by them all and it was a great grief to learn that he had passed away. The members stood in silence as a mark of sorrow.

The **President** extended a welcome to Mr. F. G. Gregory, Chairman of the Stourbridge Gas Committee and Managing Director of Webb and Corbett's Crystal Glass Company; Mr. Cook, Managing Director of Stuarts' Crystal Glass Company and Secretary of the Midland Society of Glass Technology; Mr. Stanier, Teacher of Glass Making at the Stourbridge Art School, who, as a member of the Working Party on Hand-Blown Glassware has visited many foreign countries to study their methods; and Mr. Grice, of the Parkinson Stove Co.

Mr. **A. B. Britton** (Hinckley), responding to the President's invitation to report on the Gas Engineers' National Guild, said that although there was little to report the Guild was by no means stagnant. A tremendous amount of work was being done, but little further progress could be made in negotiations with the Ministry of Fuel and Power until the new central Board had been appointed. They had been promised interviews as soon as the appointments had been made, on various matters affecting regulations under the Gas Act and other matters. The Guild was in process of being reconstituted, and numerous matters were receiving the attention of the Council.

New Members

A ballot taken during the meeting resulted in the unanimous election of the following new members of the Association: H. E. S. Birks, Engineer and Manager, Swadlincote; E. T. Pickering, Deputy Chief Chemist, Birmingham; R. P. Mitchell (son of Geo. P. Mitchell), Deputy Engineer and Manager, Worcester; and W. A. Woosnam, Engineer and Manager, Rothwell. The President welcomed those of the new members who were present.

The **President,** in introducing Mr. J. A. Tomes to present his paper on "The Application and Potentialities of Town Gas in the Hand-Blown Domestic Glass Industry" (see pp. 208-216), said they were always pleased to welcome papers from their own members, and on this occasion he was especially pleased that his own Deputy Engineer and Manager was presenting a paper during his Presidential year. Mr. Tomes had been at Stourbridge since 1941; and had gained the First Class Diploma in Gas Engineering (Manufacture) and Gas Engineering (Supply). Although only a small part of his time was concerned with the use of gas in the manufacture of crystal glass he had made many valuable contacts with glass manufacturers and technicians and had acquired a considerable knowledge of that industry.

At the close of the meeting the members were entertained to buffet tea at the invitation of the President.

EASTERN DISTRICT OF THE SOUTHERN ASSOCIATION

The opening meeting of a new session of the Southern Association of Gas Engineers and Managers (Eastern District) was held at Gas Industry House, S.W.1, on Oct. 19, and was attended by 60 members and guests.

The meeting was opened under the Chairmanship of Mr. H. J. Escreet (Gas Light and Coke Company), who introduced the new Chairman, Mr. W. K. Tate (Portsmouth), saying that his successor had had considerable and varied experience in the gas industry and, quite apart from his experience in the past, he was very active in many branches. Mr. Escreet thanked the members for the support he had been given in the past year. The meetings had been very well attended and he had in particular to thank the Secretary, Mr. J. M. Webber, for the work he had done.

Mr. Tate thanked the members for allotting him the office of Chairman. There was a very great wealth of talent in their Association and they had been fortunate in the calibre of their Chairmen, but never more so than in their choice of Mr. Escreet, who had brought much of value to the transactions and workings of their body. He had given them a varied programme of papers, useful, instructive, and interesting, and had given them a delightful county trip.

The minutes of the last meeting were then passed unanimously, and the Chairman gave a short report on the summer visit to the Ford Motor Works.

Mr. J. Cooke, General Manager of the London Counties Coke Association, then read his paper on "The Future of Coke Marketing," given in full, together with our report of the discussion, in our issue to-day (pp. 221-227).

GAS IN FRANCE

THE disastrous coal strike was not yet fully foreshadowed when the *Journal des Usines à Gaz* of Sept. 15 was issued. Indeed, the Editor permits himself to say that, without being too optimistic, the situation in the gas industry might be regarded as gradually becoming normal. Coal allocated to the industry had increased to a monthly average of 440,000 tonnes. The average calorific value of the gas sent out had been raised to 4,200 calories (say, 472 B.Th.U/cu.ft.) and, if a certain number of undertakings had not yet been able to reach this, it was thought that works actively in progress would soon permit the recovery, or even better, of the pre-war situation. Returns showed an improvement in gas and coke yields. The supply of meters had improved by 50% in the month of June over deliveries at the beginning of the year. Gaz de France is actively considering the distribution of propane. The *Journal* expects to receive very shortly the statistics of the industry for 1947 and hopes soon to be able to reproduce the report of M. Combet on the national plan for the equipment of the gas industry.

Construction of Retort Benches

M. J. Molinié continues from a paper of 1946 his study of the advantages of the use of refractories of low density in the construction of retort benches. He compares a construction in which the walls 0.35 m. thick are built with refractories of 1.8 density with insulation 0.15 m. thick and 0.8 density, against one in which there is an interior wall 0.15 m. thick in ordinary refractories of density 1.8, an intermediate wall 0.20 m. in "light refractories" of density 0.8, and an exterior wall of "extra-light refractories" of density 0.5. The heat content under given conditions of the first is 5,675,000 kcal. against 3,660,000 of the second. He compares the starting-up from cold and operation of a retort bench to the acceleration and running of a railway train. Temperature corresponds to speed, heat absorbed in heating up to energy in acceleration, temperature equilibrium to uniform motion, heat capacity of the bench to weight of the train, heat losses by radiation and conduction to power losses in friction and air resistance. And he shows that just as you reduce energy consumption by using lighter materials in the construction of your train, so you reduce the accumulation of heat in the retort bench, and consequently heat losses, by reducing the density of the refractories and insulating materials used in its construction, always with the proviso that such materials are only used in situations where they cannot reach temperatures above those at which they are physically stable.

Steaming in Horizontals

M. R. Brison reports upon steaming in horizontals at Chalons-sur-Saône. The settings contain nine through retorts 4 m. long. They were equipped for steaming as each was reset after 1939. Various methods had been used, but from January, 1944, to January, 1945, these were stabilized at the injection of superheated steam over one-third of the carbonizing period, to the extent of 20% by weight of coal charged, through orifices in the discharging mouthpieces with coke left in the end of the retort to a length of 1.5 to 2 m. at each discharge. Over this period gas made was analyzed three times a week and temperatures were taken of the coke as discharged and of the retorts after discharge. The results are shown in a graph, from which it appears that the CO content has varied from about 6 to 13%, the optimum results being obtained with coke at 950 to 1,100° C. and retorts at 1,050° to 1,100° C. Coals have varied considerably. The bench is equipped with moveable seals in the hydraulics. This arrangement permits increase of yield because one is not obliged to reduce the exhauster speed during charging, the seal has not to be overcome during normal working, and level gauge can be maintained in the retorts. But the two processes have a decided effect on the condensers, which must have cooling area from 30 to 35% above ordinary practice.

The conclusion is that, while steaming in horizontals is a useful practice, reducing the calorific value of the gas by dilution with combustibles and not inerts, to be fully effective there are several essential conditions. One must have retort capacity sufficient to be able to leave a considerable fraction of the coke behind in the retort at discharging. Carbonizing temperatures must be high without exceeding the ash fusion point. Ingress of air must be prevented, for this would burn the coke and risk fusion of the ash. And condenser capacity must be increased to the extent above indicated. Steaming increases carbonizing time, and this is costly when further settings must be put into commission to meet requirements. There is also a tendency to stopped pipes.

Metallic Structures

M. Veillon continues his series of articles with "Metallic Structures in the Gas-works." Dealing particularly with the construction of the retort house and its appendages, he points out that, in spite of the risk of corrosion and the difficulty of maintenance, the steel-framed building has come to stay; although the logical solution of the problem would be ferro-concrete. The article consists largely of a number of annotated freehand sketches. The principles enunciated and illustrated are those which have been followed in England. The chief of these are that double members and all forms of constructions involving surfaces which, if not completely covered by brick or other filling, are inaccessible to inspection and painting should be avoided; that stanchions liable to be immersed in coke heaps should be encased in concrete and diagonal bracing should be avoided. Minimum thicknesses are prescribed, but M. Veillon does not mention a rule which has been adopted by leading constructors in Britain—*viz.*, that members should be calculated according to stresses and to a low or moderate factor of safety and then there should be deliberately added a further $\frac{1}{16}$ in. or $\frac{1}{8}$ in. to their thickness for corrosion losses.

Certain materials should be definitely avoided. Zinc, for instance, is easily attacked by both acids and alkali. It should never be used, either alone or as galvanized iron, for such elements as gutters and downspouts. On the other hand, cast iron, particularly when protected by tar-base paints, is very durable. Roof and wall coverings of the fibro-cement type are vulnerable because of the necessary metallic fastenings and connexions, which often take the form of small galvanized bolts. Nevertheless this material is used for such temporary purposes as the covering of the gable of a retort house at the end which is shortly to be extended. Even here bricks in small panels are preferable, hollowed if possible to lighten them for subsequent handling. Quite a number of the sketches show arrangements of gutter and downspouts in relation to the building structure, the former generally supported on the roof rafter (not bracketted), and the latter brought down inside the building. Glazing is dealt with too briefly (we think) but there is just a mention of the possibilities of the glass brick or tile for exposed situations difficult of access.

Buildings of several types are sketched, some of which are partial coverings of the "umbrella" type. Finally there is the question, to what extent is aesthetics involved in the composition of metallic structures, or of the steel-framed building in which, it is pointed out, the whole of the weight and the stresses are taken by the steel members which themselves are more or less completely hidden by masonry or other coverings and fillings? M. Veillon maintains that much may be done by the composition of masses, by the arrangement of openings, and by attention to detail to achieve an aesthetically satisfactory result without departing from the logical adaptation of the structure to the requirements. One should tend, he says, to what he calls a linear composition, in which glazing steel members, and panels blend together in a simple form. According to the particular case, either vertical or horizontal lines should predominate. Conceived in this spirit, he suggests, certain silhouettes of metallic structures will not be without their own "aesthetic."

News items include an announcement that the French "Coal Board" has signed a convention with the Belgian "Socogaz" group to share in future experiments in Belgium in underground gasification. Coal imports from U.S.A. are dominated by the Marshall plan, but the allocation of dollars to this purpose will only permit of the importation during the year ended June, 1949, of about 6½ mill. tonnes. With the tonnages already received there will only be an average monthly receipt from October to June of 350,000 tonnes against a million tonnes per month a year ago. It is the intention of the Administration to step this up during the winter months to 450,000 to 500,000 tonnes per month, but only at the expense of deliveries in the coming spring. Stocks in the gas industry at Aug. 1 were about 650,000 tonnes, enough to cover the winter. But, although our French contemporary in writing this had already in mind the shortage in home production and strikes which were occurring in many districts, we fear the story will be still sadder next month.

Underground Gasification

Professor Pierre Demart, in a paper reported in the Memoires de la Ste. des Ingénieurs Civils de France, answers the question, "Where are we with underground gasification?" After recounting the history of the several methods used, he notes that in Russia, while since the war little information has been published, it is known that a considerable expansion of underground gasification is proposed in the last five-year plan. In Belgium a company known as Syndigaz has been formed to exploit underground gasification at home and abroad. So far practical work has been undertaken at Valdarno, in Italy, where a bed of lignite is being treated in situ. The lignite contains 55% moisture and 25% ash on the dry basis. The seam varies widely in thickness (from 5 to 12 m.). It is claimed that gas analogous to producer gas is produced at costs which do not exceed one-third of that of gas produced in generators at the surface. In France there are also deposits of lignite, too poor to be mined in the ordinary way, where it is thought that underground gasification may prove to be a paying proposition.

TOWN GAS IN THE HAND-BLOWN DOMESTIC GLASS INDUSTRY*

By J. A. TOMES, M.Inst.Gas E., M.Inst.F.,
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THE production of glass was established in the Stourbridge district by glassmakers from Lorraine in 1557, and was followed in 1676 by the discovery of lead crystal glass. The art of glass cutting, rarely practised before 1740, was brought from London about 1743 to Stourbridge. Here it quickly developed a distinctive artistry and design, and the fine quality of craftsmanship for which Stourbridge glass has ever since enjoyed an unrivalled reputation. Fine crystal may be recognized by its clear, bell-like sound when lightly tapped, by its evenness, its absolute crystal clearness, and by the extreme brilliance due to its high reflective index and perspectivity. Cut glass must possess the qualities of even texture, and clearness and brilliance of the highest degree, if the best results are to be achieved by the process of cutting. To-day, six factories in this area are engaged in the production of lead crystal hand-blown glassware.

The paper is a result of seven years close contact with this section of the glass industry, made possible by the excellent conditions already existing when the writer first came to Stourbridge. These conditions have been developed until to-day we are not looked upon as gas department officials but as friends who are privileged. This personal contact has proved invaluable in many instances, but readers will appreciate that because of it much of our knowledge is of a confidential nature, so that it is not possible to reveal all that is known. It is proposed briefly to outline the processes involved, and to give some results of investigations to date, in collaboration with the glass works, into the practicability of melting economically with town gas, as was foreshadowed in the recently published Working Party Report.

In my present position I am concerned with the development of the gas load viewed from the works and district angle, having not only to discover an economic cost per therm to compete with other fuels for large loads, but also to ascertain the economic possibilities of reaching such a figure. At the present time this Department has been forced to refuse new loads, owing to shortage of production plant, but it is hoped, however, that at a reasonable time in the future gas will be available to any consumer who may require it.

The Industrial Section itself builds all ancillary furnaces—*e.g.*, pot arches, glory holes, &c., the design being modified as occasion demands to suit new ideas or developments. With regard to melting furnaces, we are interested in the design and building of prototypes, but it will be appreciated that, once the principle is established, it is a furnace builder's job, since the Department could not cope with the work; although it is always keenly interested in improving their efficiency.

Heat Requirements of Average Works

The manufacture and manipulation of glass demand heat in varying quantities in almost every phase. The heat requirements per week of an average works are as follows:

Melting	66 tons of coal, or 7,560 gall. of oil, or 2,685,000 cu.ft. of gas	12,082 therms
Ring heating.. ..	3,000 cu.ft. of gas	13.5 therms
Pot arching	100,000 cu.ft. of gas	450 therms
Desulphurizing ..	10,000 cu.ft. of gas	45 therms
Glory holes	165,000 cu.ft. of gas	742 therms
Annealing	267,000 cu.ft. of gas	1,201 therms
Cracking off	1,000 cu.ft. of gas	4.5 therms
Edge fusion	7,000 cu.ft. of gas	31.5 therms
Acid polishing and water heating ..	30,000 cu.ft. of gas	135 therms

It is obvious that the maximum heat requirement of the glass industry is for melting of the raw materials. Conversion to town gas firing of existing multi-pot furnaces in this area would mean an additional annual load of 700 mill. cu.ft., representing a base load, since it would vary little hour by hour.

It is one thing, however, to talk glibly of an ideal load of this character and another to prove to the glass manufacturer that town gas is the fuel for the job, both practically and economically. As a result of our experiments he is now quite convinced of its practicability, so much so that he is anxious to employ our main product as soon as economically possible; and what follows will outline to the reader some of our progress to date in an endeavour to prove that gas can compete economically in a sphere which has hitherto been regarded as hopeless.

* Paper presented to the Midland Association of Gas Engineers and Managers, Birmingham, Oct. 21, 1948.

Raw Materials

The industry melts mainly lead crystal glass of an extremely high quality. The introduction of lead gives a glass which is soft and suitable for cutting, and by greatly increasing the light refraction imparts to it a much greater brilliance. The glass must be crystal clear in texture, as near colourless as can possibly be obtained, and capable of taking a high polish. Unless properly and scientifically melted, even lead glass would lack all these properties, so that, although the general formula for lead crystal glass is similar to that discovered in the 17th century, each works has its own particular mixture. Soda lime or potash-lime glass is used, to a smaller extent, for articles employed daily in the home, and which are normally not cut—*e.g.*, tumblers, containers, &c.

Glass Melting Furnaces

Glass melting may be carried out in either pot or tank furnaces. Pot furnaces are those in which the glass is melted in pots (either open or closed) which are placed in the combustion chamber, whereas in a tank furnace the lower walls of the chamber contain the molten glass in the form of a pool, across which the flames play directly on the raw batch and molten material. Tank furnaces may be either continuous or discontinuous. In the latter case they are known as day tanks, which are small melting units holding a charge normally capable of being melted and worked in one day. In general, it is usually said that where quality is the decisive factor, which in this area is obviously the case, the pot furnace utilizing closed pots is to be preferred to the tank, in view of the protection afforded to the glass from contamination by the furnace gases. Fig. 1 shows glassmakers working at a typical multi-pot furnace.

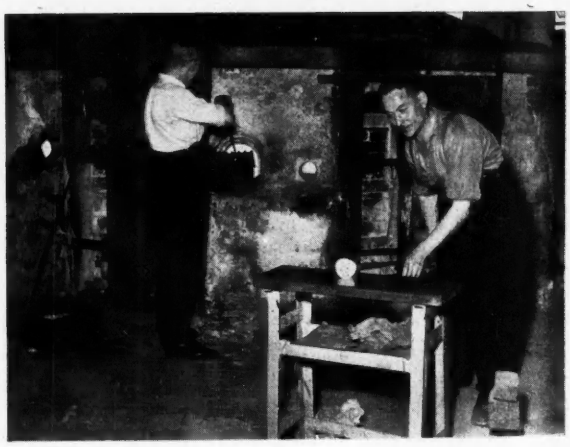


FIG. 1

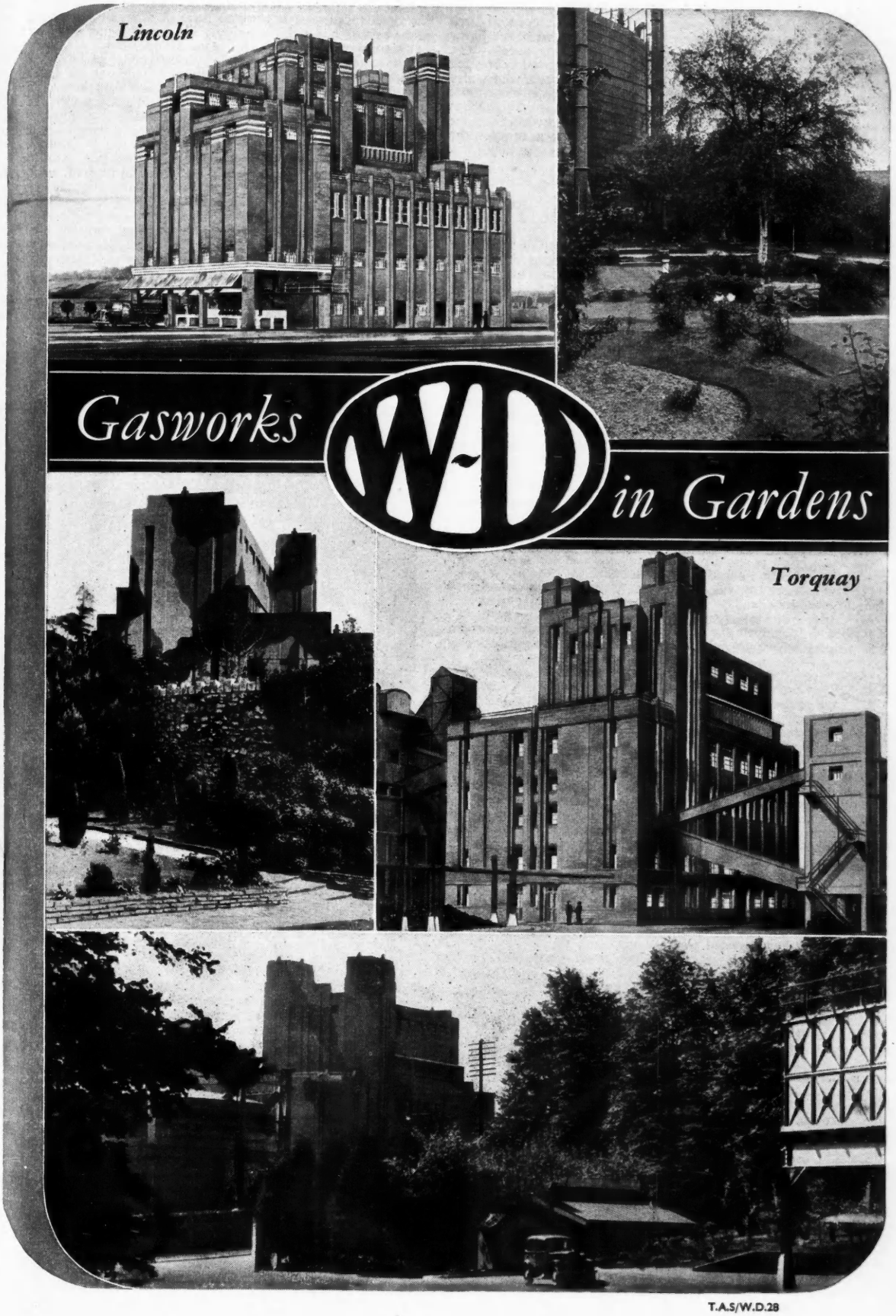
Melting of Raw Materials

After the batch has been carefully prepared and well mixed, it is shovelled by hand, together with the correct amount of cullet, into the pots in two or three fillings, usually at six to eight hourly intervals

The melting process may be said to occupy two periods—*viz.*: (1) founding; (2) plaining.

(1) During the founding period gases are liberated due to the melting of the constituent items of the batch, and these, together with the occluded air between the batch and cullet particles, attempt to escape through the metal. Although most is freed, a considerable portion is unable to rise through the viscous mass, where it remains in the form of bubbles. At the end of the founding period all the batch has disappeared, and a vitreous liquid full of gas bubbles remains. Due to the addition of fresh charges of batch, the temperature varies considerably during this period, but slowly rises to the maximum required for the "plain."

(2) The plaining period has for its object the removal of the bubbles, so that the glass may be said to be "plained," and the success of the process depends on the extent to which they are removed. During this period the glass is at a maximum temperature at which it is essential it should be accurately maintained. This is about 1,350° C.



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for lead glass, but may be as high as 1,400° C. for boro-silicate glass. With a high temperature the gases are liberated in the form of large bubbles, and due to the glass being less viscous and therefore offering less resistance, are able to rise more easily. Fining agents—*e.g.*, arsenic, antimony, and nitrates—assist in plaining the metal by creating a stirring action due to the evolution of large bubbles which also sweep out the seed (or small bubbles) and render the glass more homogeneous. A rapid found at a high temperature is advantageous to avoid seeds. The metal is sampled by dipping, and when plain the pot is " taken down "—*i.e.*, the stopper is removed so as to allow the glass to cool to a temperature suitable for working (*circa* 1,200° C.).

Pot Furnaces

Pot furnaces may consist of one to 20 pots, open or closed, being used for widely varied types of glass and fuel. The usual number of pots it contains is eight, 10, or 12.

The use of covered pots, while allowing accessibility for filling and comfort in working, permits quantities of different glasses to be melted in each, serves to protect their contents from the furnace atmosphere, and permits the finished melt to be cooled to gathering temperature without materially affecting other pots in the furnace.

Where a clean fuel is available—*e.g.*, town gas or coke oven gas—the possibility of using an open pot arises. With such a pot increased speeds of founding may be obtained, with consequent saving of overall fuel consumption, so much so as to permit all melting to be carried out during the night and all working during the day, thus giving all pots a uniform melting schedule. This method of operation closely resembles that of a day tank, as referred to above. Pot furnaces were originally directly or semi-directly fired, but development has resulted in the use of:

(*a*) Regenerative furnaces—larger units employ producer gas generally, but may be used on coke oven gas, oil, or coal gas. These have in general given way to:

(*b*) Recuperative type, owing to the steadier conditions which are obtained, the lower capital cost, and the easier disposition of uniformly heated pots.

In general in this country multi-pot recuperative furnaces using closed pots have been widely adopted for lead crystal glass because:

(1) There is no possibility of contamination of the glass by fuel, due to the protection afforded by the hood.

(2) The efficiency of the larger over the smaller units on purely thermal consideration.

(3) Comfort of working at a closed pot.

(4) The finished melt may be cooled to gathering temperature without affecting other pots in the furnace, allowing continuous working, in contrast to the use of open pots.

(5) Centralization of production.

But they have the disadvantages of:

(1) Lack of flexibility.

(2) Being impossible to use in most efficient manner because of some pots founding at the time when others are working.

In multi-pot furnaces, continuous melting is practised so that melting and working take place side by side, the pots being filled to suit the working schedule.

Each pot contains approximately 15 cwt. of lead crystal and occupies one of the arches supporting the furnace crown, with its hood built into a removable wall between the pillars of the arch. The pots stand on the floor (or siege) of the furnace and are arranged in a circle round a circular hole (or eye), through which the flame, from whatever source it is derived, rises. The flame is slow moving and mellow, filling the entire combustion space and completely enveloping the pots. As far as possible a hard flame should be avoided, as this causes attack on the base and rear of the pots and results in a poor pot life. The furnace is worked on natural draught, under which recuperation is introduced. Glass which escapes from broken or leaking pots is caught in a glass pocket provided for this purpose. The melting process usually takes 25-35 hours, depending upon glass and furnace temperature.

Method of Firing with Town Gas

When first called upon some five years ago to carry out a temporary conversion to town gas of a coal-fired 10-pot furnace by King, Taudevin, and Gregson, Ltd., in order to enable producer repairs to be carried out, the writer adopted the use of a burner-head together with a series of vertical tees, to allow adjustment of the head to the optimum position. The head was primarily inserted in the uptake to the eye, so that the top coincided with the venturi throat just below the secondary air ports. This was done through the cleaning door at the bottom of the uptake, a seal plate having been prepared to take the place of the door itself. In this position combustion took place on the top of the head—*i.e.*, it acted as a burner—but it was considered that the flame was too hard and not sufficiently slow moving, and after a time it was lowered about 12 in., when combustion took place as the gas met the incoming secondary air and burnt off at the head, so that the burner was now virtually an open-ended pipe. In this position conditions were excellent. For future firings, therefore, it was considered that an open-ended pipe placed anywhere in the producer gas main, and as far away from the point of combustion as desired, provided the main was gas-tight, would be satisfactory. This has proved to be the case.

After the producer gas main has been sealed off from the producer, the open-ended pipe is inserted through a prefabricated seal plate at the base of the uptake to the eye. Gas supply is controlled by means of a slow moving 3 in. gas valve, manually operated. Air is controlled to suit requirements of the gas flow as determined by Orsatt analysis.

In a Teisen 10-pot furnace provision is made at the base of the furnace for admitting gas to the central portion of the eye, together with auxiliary firing, if desired, of the main glass pocket, in order to keep it sufficiently hot to avoid glass solidifying at this point and refusing to run out. This furnace employs a tangential burner, where secondary air is admitted tangentially and is caused to swirl round the gas stream. Combustion is thus delayed, resulting in a levelling up of the temperatures at the back and front of the pot, and, since the edge of the burner is never swept by flame but only by hot air, the life of this part of the furnace is claimed to be considerably improved.

In all cases when using coal gas on multi-pot furnaces, the works concerned have expressed themselves as being 100% satisfied with the conditions obtained.

Economics of Firing with Coal, Oil, and Producer Gas

We have been most fortunate in being able to draw a direct comparison under identical conditions on a 10-pot Teisen furnace, fired alternatively by producer gas, oil, and town gas. Temperature of furnace as recorded in crown was 1,400° C. Oil was atomized and fed in from the centre of the crown. Gas was controlled manually on a 3 in. slow moving valve. (Fig. 2.)

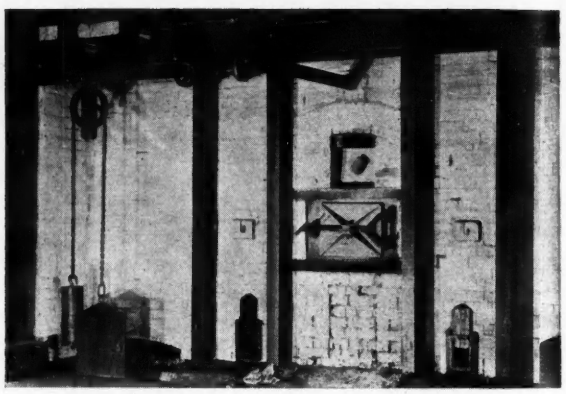


FIG. 2

Results Obtained

Calculated on prices of fuels ruling July, 1948.

Producer Gas

Coal used.—With a good quality coal this averaged 22 tons per week over a long period. Cost.—60s. 9d. per ton delivered.

Maintenance.—Consisted of straightening fire bars and tools, renewals, &c.

Labour and ash removal.—Rate per hour per man in all cases was taken as 2s. 4d. and assessed as accurately as possible, in each case, by agreement with the employer concerned, with every allowance made where necessary for a man who has other duties to perform in addition to " teasing "—*e.g.*, pot filling, metal picking, &c.

Running cost per hour per furnace.—Coal, 8s.; maintenance, 1d.; labour, 2s. 4d.; total, 10s. 5d.

Oil

Oil used.—15 gall. per hour at 9d. per gall. It should be noted that this cost varies with the quantity of oil purchased. In the case in question three furnaces were on oil.

Maintenance.—Greasing and oiling, ancillary plant renewals.

Depreciation.—Allowed 10% of cost of ancillary equipment necessary.

Electricity.—Cost per unit ¾d. This is necessary with oil firing for fans, pumps, and boosting heaters. Again this favours oil firing, as works concerned employ waste heat for heating storage tanks, otherwise immersion heaters would be needed to raise the oil to the requisite temperature for pumping.

Cost per hour.—Oil, 11s. 3d.; electricity, 4d.; depreciation and maintenance, 8d.; labour, 3d.; total 12s. 6d.

Coal Gas

Gas consumption.—(C.V. 450 B.Th.U./cu.ft.) 5,320 cu.ft. per hour at 8⅛d. per therm, less 2½%.

It must be borne in mind that the furnaces were designed to work on producer gas, so that for optimum results with town gas the diameter of the main, &c., should be recalibrated to suit the higher quality gas.

Cost per hour.—Town gas, 15s. 8½d.; labour (as furnace not automatically controlled), 3d.; total 15s. 11½d.

The total capital charge is ignored, but if it were taken into account on a new furnace then it would be in favour of town gas firing.

To compete with oil at these figures the cost of town gas would require to be 6.28d. per therm and with coal 5.23d. The cost of all fuels has mounted steadily for many years and particularly during the last decade. Increased deliveries have enabled us to prevent a proportionate rise in the cost per therm. In view of the fact that prices show no sign yet of becoming stabilized it would not be a sound policy to lower the price of town gas. It appears, therefore, that the solution is to endeavour to increase the efficiency of the process, in order to effect the same purpose.

Single Pot Furnaces

An extract from the Working Party Report on Hand-blown Glassware reads as follows:

"There seem to be good grounds for believing that a greater efficiency would result from the replacement of the multi-pot furnace by smaller units, thus giving more economical firing, better temperature control of individual melts, and reduced idle time of pots. Investigations to which we attach great importance are now being made into the practicability of melting in open pots in small furnaces, or in small tank furnaces, working continuously or discontinuously. The merits of various types of fuel have been fully considered and, provided a reasonable tariff and supply could be obtained, the best fuel is town gas or coke oven gas. Fuel oil is satisfactory, so is 'raw' producer gas, though neither is considered suitable if open pots or tanks are used for melting, because of the danger of contaminating the glass with impurities from the fuel itself."

For small scale melting, the advantages of town gas, in particular its simplicity, reliability, constant quality and pressure, cleanliness, and availability, far outweigh any extra cost involved. Small pots are employed for experimental or learners' use, and for production of small quantities of special glass.

A furnace built by the Department, in use at the Stourbridge Art School for training glassmakers contains three pots, two of which each hold about 2 cwt. of lead metal, while the third contains approximately ¼ cwt. It is controlled by hand on valves in the gas line, and an indicating pyrometer inserted in the combustion chamber shows the temperature of the furnace. The furnace works continuously from September to July, new pots being installed each September. One found only is worked each week, the pots being filled on Friday so that the glass is ready for gathering on Monday morning. With a working and founding temperature of 1,220° C. in the combustion chamber the gas consumption is 460 cu.ft. per hour. The quality of ware produced from this furnace is of such a high standard that many pieces have been shown in exhibitions throughout this country and abroad.

Another furnace built by the Department contained a 24 in. by 24 in. by 27 in. closed pot capable of holding approximately 4 cwt. of metal. It is used in the melting of special glass for use in colour matching instruments. The furnace is under natural draught, with a firebrick recuperator below the pot. It is fired on one side only, by three burners using 1½ in. Amal injectors. The pot stands on a sillimanite tray, which acts as a metal pocket, and any excess flows through the rear of the furnace. Gas consumption at 1,350° C. is 460 cu.ft. per hour.

Examples of furnaces using normal size pots are as follows:

A furnace, built by the Department, contains a closed pot holding approximately 18 cwt. of lead crystal. The crown follows the contour of the pot and is built to allow a combustion space of approximately 6 in. round it. The furnace is heated by means of neat gas, while the air for combustion is under pressure and derives about 350° C. of preheat by passing under the floor of the furnace before it meets the gas. Founding with a crown temperature of 1,380° C. usually takes about 38-40 hours, with a gas consumption of 690 cu.ft. per hour, and, working at 1,320° C., 610 cu.ft. per hour. The average gas consumption over a period including founding and working was 625 cu.ft. per hour.

On a similar furnace (but with a straight crown) holding a 36 in. by 36 in. by 40 in. pot, and having an approximate capacity of 15 cwt., tha gas consumption was 600 cu.ft. at 1,350° C.

A further furnace built by the Department holds a 36 in. by 36 in. open pot and has a capacity of approximately 15 cwt. It is important in such a furnace to build the crown with good refractories, in order to avoid stones in the metal. This furnace was fired with the concentrated combustion type of burner (the C.C.) but no attempt at recuperation could be made, since it was found that the C.C. burner in its present form was not suitable for use with preheated air, due to the cracking of gas with subsequent deposition of carbon, and the inward growth of the airways to such an extent as to render the burner useless. Excellent speeds of plaining were obtained as show by the following figures: 5 p.m., first fill; 11 p.m., second fill; 9 a.m. next morning, metal plain. Thus the metal was plain within 16 hours, which with an 8 hour shift for making would permit of working to maximum capacity per day, providing sufficient operatives were available to empty the pot in the shift. A further factor with this furnace was the life of the pot, which lasted practically 12 months. Average gas consumption over a period during founding and working (at 1,300° C.) was 719 cu.ft. per hour. This furnace was our first step to ascertain if it were possible to produce glass of a sufficiently high quality to satisfy the local trade from an open furnace or tank, so as to enable us to take advantage of the heat saving which must of necessity attend such a furnace. It was found that this was possible.

A recuperative single-pot furnace built by Messrs. Sismey & Linforth, Ltd., takes an open pot 39 in. by 24 in. (capacity approximately 8 cwt.). Air is admitted above and below the incoming gas port, and the flame is directed on to the surface of the metal contained in the pot. At the present time experiments are being made to find the most economical method of using this furnace, balancing high temperature—and thus high gas consumption and a quick found—against lower gas consumption and a slow found, bearing in mind that the latter condition implies more idle time for the furnace. At the moment, with a temperature of 1,400° C. for founding, a founding time of 12 hours is obtained, and with a working temperature of 1,350° C. the gas consumption over a period was 700 cu.ft. per hour. It would appear that the advantage gained with an open pot in speed of plain is discounted to some extent by the greater heat losses during working.

Advantages of Single-pot Furnaces

1. Very flexible—output of glass may be varied according to the demand, by shutting off individual furnaces as required.
2. Accurate temperature control of individual melts to suit type of glass.
3. No pot arch necessary—pots arched in furnace itself.
4. No risk of chilling of pots; therefore pots should have a longer life.
5. Simple to build.
6. Smaller furnaces may be built for smaller pots, instead of inserting smaller pots in larger furnaces.
7. Improvements possible as life is relatively short, and design could be altered. Conversely, multi-pot furnaces last 10-14 years.
8. Use of town gas or coke oven gas permits of the use of open pots, together with other attendant advantages of these fuels.
9. Better design of glass house possible.
10. When a multi-pot furnace reaches the end of its life, its large capacity is lost for a considerable period during rebuilding. With a single pot this problem never arises.

Disadvantages

1. Due to the relatively greater heat losses from the structure, the furnace could obviously not possess the same thermal efficiency as a multi-pot furnace.
2. If furnace was employed as a pot arch, a stand-by must be worked to avoid a week's loss of production, in case of pot failure.
3. Instrumentation would be needed on each furnace instead of one.
4. To take advantage of increased speeds of melting, it must be possible to empty the pots quickly, which might be difficult if light ware was being produced.

It is therefore for the works themselves to decide whether their production will permit of the use of such furnaces in preference to the multi-pot.

Tank Furnaces

The two main systems of tank-furnace practice may be divided into either (*a*) regenerative, or (*b*) recuperative, and further subdivided into continuous or discontinuous.

Discontinuous or day tanks are widely used on the Continent, and up to approximately 20 tons capacity are of the recuperative type. In general they permit the disposition of a greater number of working holes per unit area than continuous tanks, but are of a lower efficiency. They may be fired with any fuel, but with coke oven gas, town gas, and oil the air only is preheated.

(*a*) The continuous regenerative tank furnace is the most efficient method of melting, and the deadweight capacity would be anything up to 1,000 tons and the depth of metal 2 to 4 ft. approximately. The tank is generally divided into two main compartments by a floating bridge or a hollow wall which contains a hole below the surface of the metal, through which the glass flows as it plains from the melting and refining end to the working end—*i.e.*, the batch is fed in at one end, where it melts and passes down the furnace, to the working end, where it is withdrawn. In view of the size of such tanks they must of necessity be used for processes which take advantage of their huge size and melting output (up to one-third deadweight capacity per day), and they are generally used for ware which is needed in large quantities.

(*b*) Recuperative tanks may be of both kinds and have the advantage of: (1) lower capital cost; (2) steady conditions; while (3) they compare well with regenerative furnaces for efficiency when using coke oven gas, town gas, or oil.

The bulk of commercial glasses are to-day melted in tanks using producer gas, coke oven gas, or oil. Lead glasses have been and are being melted in tanks of various sizes, although it has always been regarded that where quantity was the deciding factor tanks should be used, but where quality was most important then pot furnaces were essential. In view, however, of the special quality which is required in the Stourbridge ware, this method of melting has not been developed in this area until recently. No pots or pot arches are required with tanks, and this in itself affects a considerable saving. In addition, the repair of tank furnaces is fairly simple and not very costly, whereas with a pot furnace this is a major operation after,

say, 12 years' life. Further, in order to produce a special quality ware, a clean fuel must be employed, to avoid contamination of the glass by foreign matter deposited during combustion.

The reader will appreciate that the tank furnace must of necessity be more efficient than the pot furnace, but that the former is usually a comparatively large producing unit. An average pot furnace containing 10 15-cwt. pots would do two-and-a-half founds per week. At a factory with two 10-pot furnaces, two-and-a-half founds per week would mean a glass production of 750 cwt. per week over, say, a six-day week, which would be equivalent to approximately 6 tons per day. This would represent a comparitively small tank to handle the whole of the output of the factory, with the attendant disadvantage that the whole of the production would be in one unit. Further, the coal used on the two 10-pot furnaces would average 42½ tons per week; therefore the rate of production from the furnace would be approximately 1 ton of glass for slightly more than 1 ton of coal. With a modern large continuous tank furnace, one would expect a production of at least 1 ton of glass per ½ ton of coal. It is virtually impossible to compare directly a pot furnace and a tank furnace, in view of the fact that the efficiency, in terms of the fuel used in relation to the glass melted and worked, depends on the method of operation by which the glass is removed from the furnace. At the present time there is wide divergence between factories in this area in the number of melts per pot per week, depending on the ware being made and the number and skill of the operatives available. These figures, however, give an indication of the fuel saving which might be effected by the use of tanks.

A continuous tank furnace would, of course, be the ultimate aim, but the following factors are of importance and must be borne in mind:

(*a*) Major thermal efficiency requirements should be placed against production requirements, so that glass should be removed as it is plained.

(*b*) The disposition of glassmakers round the furnace might not be so easy as with a multi-pot furnace.

(*c*) Our problem was to ascertain if it was possible to produce, from the tank furnace, glass of a standard of quality suitable for the special Stourbridge trade.

We are now able to say that, as a result of local experiments with day tanks, it is possible to get glass from them which is considered suitable. At a Stourbridge works a small experimental tank was operated successfully and only suffered from limitations due to its size, which was too small for continuous production. Also at the present time one day tank is in continuous use at a Stourbridge works, and the quality of the ware is such that it was shown at the British Industries Fair in London (1948). Furthermore, the furnace appears to be attended by the anticipated speed of melting (about 8 hours), and by a considerable saving in fuel. Unfortunately we are not at present able to amplify these statements. Suffice it to say that this is regarded as a major step forward and one which opens a new field for development to the advantage of both the gas and the glass industries.

Ring Heating

Irrespective of batch employed, it is found that with all glass melts a slight amount of scum is developed which floats on the molten surface. It is necessary to prevent this scum or any other floating

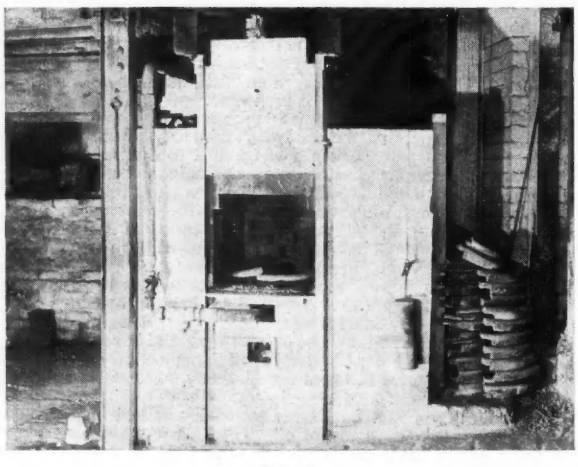


FIG. 3

foreign matter from interfering with the gathering of the glass. This is done by the use of a fireclay ring some 15 in. in diameter and about 3 in. thick, made in two halves. Before gathering is commenced, a small area of glass in the pot is skimmed and secured by the use of the ring, which floats on the surface, since its specific gravity is much lower than that of the glass. The two halves are arranged together and in a day or so appear to form a solid ring. These rings are heated up with the pot during arching, or alternatively heated in a separate ring furnace (Fig. 3).

In the latter they are usually heated up to 1,000° C. in 48 hours. The furnace is of very simple design. Town gas enters at the front, below the floor of the furnace, where it mixes with air and passes into the working chamber via ports situated on either side.

Pot Arching

A pot is a large refractory crucible peculiarly shaped to suit the purpose for which it is used, and possibly the largest regularly made. It requires accurate temperature control throughout its life. When it is desired to replace a working pot which has broken, it is clear that the pot must be preheated before being placed in position in the pot furnace. This is carried out in a furnace known as a "pot arch," which is usually capable of holding two pots. The furnace is raised to a temperature of 1,100°-1,150° C. over a period of seven days,

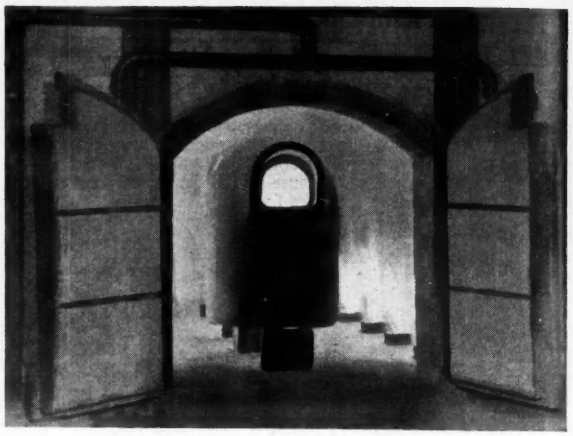


FIG. 4

when the removable wall of the pot furnace is pulled down, the old pot removed, the new one introduced, and the wall rebuilt.

Town gas is ideal for this process owing to its many advantages, while in addition:

(*a*) A much better heating schedule is obtained.

(*b*) As a result of (*a*) pots arched with gas are better than those with coal.

(*c*) Wear and tear on the arch is greater with coal than gas.

(*d*) Since introduction of gas-fired pot arches it has been found possible to arch to 1,150° C. in five days if desired, while maintaining an excellent pot life. The minimum with coal is seven days, in view of the less accurate temperature control possible. In one emergency a works arched with a gas-fired pot arch in just over three days, and the pots had quite a satisfactory life.

(*e*) It is cheaper to use gas—*e.g.*, in a test on two arches each containing two pots with one coal and one gas fired, the following figures were obtained:

Gas used over a period of seven days to heat to 1,100° C., 75,000 cu.ft. at 8$\frac{9}{16}$d. per therm, less 2½% = £11 2s. 5d. (This is an average gas consumption; lower figures have been recorded.)

Coal used, 5 tons 2 cwt. at 60s. 9d. per ton delivered = £15 9s. 10d., to which must be added cost of labour and ash removal, &c.

All pot arches in this area are now fired by town gas, except in the smallest factory, which has requested a supply of gas for this purpose as soon as it is available.

In Fig. 4 pots may be seen before being withdrawn from the arch at the end of the firing period. The pot arch in question was built by the Department, and employs recuperation below the floor.

Glory Holes

It is necessary to reheat all hand-made ware to enable manipulation into the desired shape. This is carried out in small furnaces called glory holes.

When the glass is heated in an open flame using town gas, a chemical reaction film is created by interaction between the flame or products of combustion and the glass itself, which takes the form of a white mist and is commonly known as "bloom." This is largely a result of sulphurizing, due to the sulphur compounds other than sulphuretted hydrogen in the gas. Although this occurs with both soda-lime and lead crystal glass, it is a particular source of trouble with the latter. The sulphur forms sulphur dioxide, which, with oxygen from the air, can react particularly with sodium oxide and lead oxide to produce sulphate. Sodium sulphate film is capable of being washed off with water, but that of lead sulphate may only be removed by acid washing, which dissolves a thin film of glass from the surface of the article.

Opinion is divided as to whether the bloom imparts mechanical strength to the glass, but it is troublesome inasmuch as it prevents

handles, &c., adhering to the body of the article, and necessitates acid washing of plain ware.

The remedy is to reduce the sulphur content of the gas to a point where the bloom disappears—*i.e.*, 6 grains per 100 cu.ft. or below. Glassworks have therefore installed desulphurizing plants to accomplish this, and normally reduce the sulphur content to 3 grains per 100 cu.ft. Benzole washing is carried out at the gas-works; and, realizing the glassworks' problems in respect of sulphur, the Ministry of Fuel and Power allowed the Department to continue washing throughout the fuel crisis.

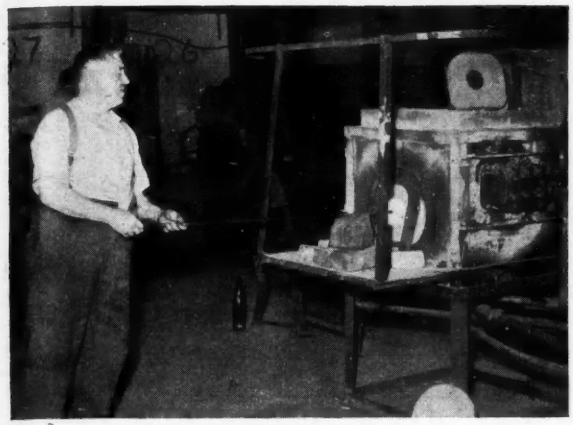


FIG. 5

In an effort to avoid the expense of desulphurizing (which costs about 0.25d. per therm, besides capital charges) the Department experimented with a glory hole having a permeable lining. Readers will recall that in this method of furnace construction the products of combustion of the gas are drawn through porous furnace walls into an annulus behind them, whence they are removed by means of an eductor. The glory hole gave excellent results with low gas consumption for a period, the ware being quite free from bloom, but unfortunately it was found that in time the lining gradually became glazed and therefore useless.

A standard glory hole was built by the Department. Each works has a number of these furnaces situated round the glass house. The size of the working chamber will vary with the work for which the furnace is intended. They are usually built with two working holes so that two workmen may work at the one furnace, the working holes being designed to take the largest article and being reduced to the requisite size for smaller ones by the use of stoppers or fireclay. Concentrated combustion burners are employed, which have proved very satisfactory. The use of these burners has enabled higher temperatures (*c.* 1,300° C. to 1,400° C.) to be maintained, with a consequent speeding up of output. The linings of the furnace are usually of sillimanite, but, in order to reduce heating-up time to a minimum, hot faced insulating bricks of low thermal capacity have been employed for lining. A glory hole equipped with these would be at a temperature at which work could commence in 25 minutes, but, in view of the comparatively short life of these bricks, most works prefer the sillimanite linings. The gas consumption for glory holes naturally varies with size of the combustion chamber, number and size of working holes, and the working temperature. For a furnace, however, having a working chamber 11 in. diameter by 22 in. long, with two 6 in. working holes, working at 1,300° C. (see Fig. 5), gas consumption would be approximately 480 cu.ft. per hour, while with a hole having a working chamber of 18 in. diameter by 24 in. long, and one 12 in. working hole (see Fig. 6), the gas consumption would be 700 cu.ft. per hour.

Annealing

Glassware leaving the maker contains inherent strains as a result of contraction due to the too rapid cooling of the glass from the softened state. These must be removed by annealing, which consists of heating the ware to a point where strain is removed, and then allowing it to cool so slowly that appreciable temperature differences between different parts of the glass do not occur.

For every glass there is (*a*) a lower annealing temperature below which permanent strain cannot be removed or re-introduced, and (*b*) an upper annealing temperature where strain removal is rapid due to internal "flow" between layers.

Annealing therefore consists of three stages:

(1) Inherent strain removal. As the first stage in annealing all articles are heated for a short period (depending upon the thickness and composition of the ware) at a temperature below the softening point and in the "annealing range," so that a uniform temperature distribution is achieved.

(2) Slow cooling to a temperature below which permanent strain cannot be re-introduced.

(3) Rapid cooling to room temperature, the rate of such cooling depending upon the characteristics of the glass in question (particularly its capacity to stand thermal shock).

For any given thickness of glass there is a maximum cooling rate depending on the thermal endurance and inherent strain in the glass —*e.g.*, English has shown that a rod of alkali-lead-silica glass could be perfectly annealed by heating it to 450° C., cooling to 400° C. at the rate of 2° C. per minute, then cooling to 300° C. at a rate somewhat less than 1° C. per minute, and finally lowering to air temperature at the rate of 5° C. per minute.

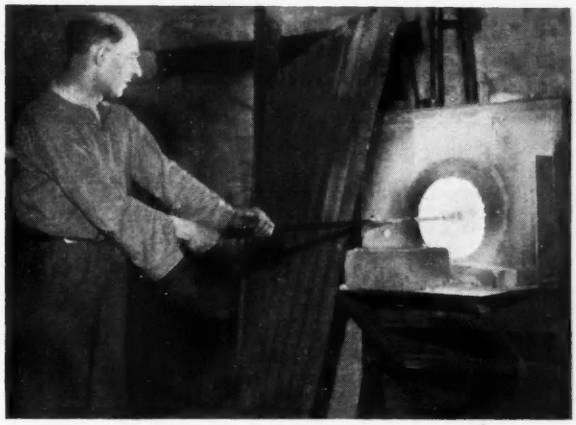


FIG. 6

Annealing Furnaces

Two types of furnaces are used for its removal: (*a*) Lehrs or continuous annealing furnaces; (*b*) kilns.

(*a*) A lehr consists fundamentally of a long tunnel through which the glass is passed on a conveyor, the tunnel being heated in such a manner that the glass may be treated in the predetermined manner efficiently and economically. It must be capable of producing any temperature curve required within fine limits, depending on the type of glass, wall thickness, &c.

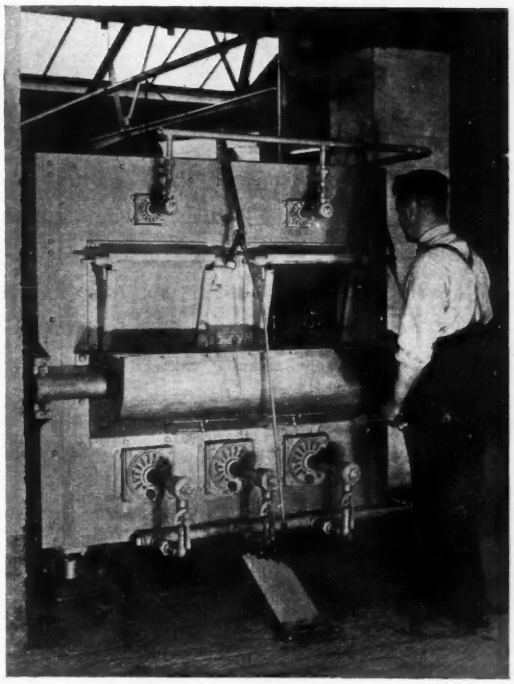


FIG. 7

The conveyor employed in a typical continuously operated muffle lehr is of woven wire, and is driven by an infinitely variable gear, so as to obtain a large range of speeds. Although the belt is in constant motion, the temperature curve in the tunnel is static and can be pre-

selected to suit the type and size of glass which it is required to anneal. The main burners for heating the furnace (the gas to which is automatically controlled) fire directly from the charging end into a muffle combustion chamber situated below the conveyor. The products of combustion are taken off to the main waste gas flue at various points. A number of gas-fired radiants are provided near the charging door and are recessed into the side of the annealing chamber in order to counteract, by direct heating, the door losses, by creating a little extra pressure in the lehr and so reducing the possibility of draughts. They are also useful for keeping the lehr warm and bringing it up to temperature economically. Figs. 7 and 8 show a modern lehr of this type recently installed at a local works.

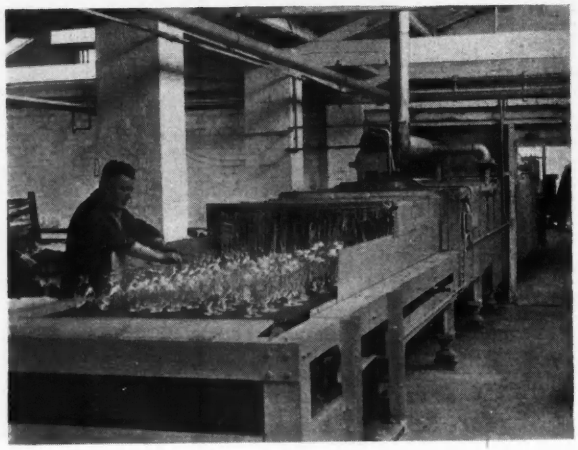


FIG. 8

The preheating zone permits glass that has partially cooled to be introduced into the lehr, which is set at a lower temperature, thus reducing any initial thermal shock. The lehr quickly takes charge of the glass when once inserted, and re-introduces the appropriate increase in temperature. In the annealing section, the rate at which the glass may be cooled is governed generally by composition and experience as to the ultimate requirements of the article, but it is the first section of the second zone that has to be so carefully controlled —namely, from the annealing temperature down to approximately 100° C. lower, depending on the type of glass, &c. This is often referred to as the slow cooling section. From these temperatures downwards a more rapid cooling operation is possible, and controlled artificial cooling by means of a fan can be introduced if desired, after the glass has been reduced to a temperature below which any permanent strains can occur.

In an area where mass production methods prevail—*e.g*, bottle production—the heat input into the lehr in the form of ware may be sufficient to maintain the temperature required in the annealing zone, and very little external heat will be needed. With hand-made ware as produced in this area, however, it will be appreciated that production is reasonably slow and that the heat input to the lehr from the ware is correspondingly low. The annealing time is usually 2½ to 6 hours, depending on the type of ware, while gas consumption will vary between 450 and 650 cu.ft. per hour.

(*b*) Kiln.—The old type of kiln consisted of a brick chamber, with single or double doors, heated by solid fuel. The kiln was packed to capacity with the ware, and then sealed, its temperature being allowed to fall till it was sufficiently cool to empty.

The modern counterpart of this is the strain-relieving oven of the hot air circulating type, which was first adapted in this area for use with glass.

The ovens have a guaranteed temperature uniformity of +2° C. in all the working space, and the air, circulating at a predetermined rise or fall, subjects all faces of the load, on all planes, to the same temperature conditions, and thus enables full advantage to be taken of the maximum cooling rate. The ware is normally placed in hot, but certain special types of low expansion glasses (*e.g.*, boro-silicate projector lamps for use with radar) will stand the thermal shock of inserting cold ware into the hot oven.

The oven operates up to 550° C., and no products of combustion enter the working spaces. The heating up, time of soak, and annealing curve are controlled by a programme controller operating in conjunction with a solenoid gas controlled valve, by-pass cock, &c. The cooling schedule is marked out and pre-cut on a cam, which cam alters the control position of the recording controller to satisfy the predetermined requirements. Both the cam and the controller are driven by a synchronous electric motor. The load is stacked on sliding trays, and when the oven is fully loaded the glass is annealed to a guaranteed temperature curve. The kiln is invaluable inasmuch as cases are avoided where the lehr would be called upon for a long time schedule for a small amount of ware—*e.g.*, thick walled articles.

Articles which have been blown in a mould—*e.g.*, tumblers—require the top to be cracked off to the desired height and the rim smoothed. This is carried out on the machine as illustrated in Fig. 9. The article is placed on the centre table, which is rotated by hand so that the diamond lightly cuts the glass at the required height. It is then transferred to either of the two outer tables, which are rotated mechanically; and where gas flames play on the cut the sudden expansion causes the glass to spring apart in an even fracture. The burner utilizes four very fine flames, to obtain which compressed air is employed. The rim is then ground on a stone wheel to leave it even and smooth, after which it is melted on the machine illustrated in Fig. 10. During this process it is obvious that a portion of the glass is raised

FIG. 9

to a temperature where strain may be re-introduced, and great care is taken to avoid this possibility, as the ware, particularly heavy articles, cannot be subjected to violent thermal shock. The burners employed are of the Marshall or Bornkessel type, although butane or oxy-coal

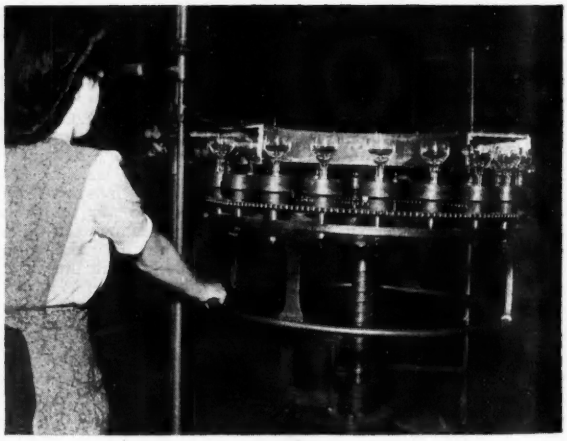


FIG. 10

gas may also be employed. These burners are particularly suitable for the edge melting process, and eliminate many of the difficulties experienced when using other types.

Decorating and Polishing

The leady crystal ware is now ready for decoration, which may be carried out by cutting, intaglio, engraving, &c. Cutting is the most popular and is carried out by grinding away the glass by hand, on carborundum, or stone wheels, to suit the requisite design.

After cutting or intaglio decoration has been applied the article must be acid polished to restore the original surface. This final process is carried out by immersing the article in a mixture of hot concentrated hydrofluoric and sulphuric acid contained in a water jacketed lead vat and heated by town gas. After a certain time the article is removed and washed in a weak alkali solution of an equal temperature to the acid, in order to remove all traces of the operation. This cleansing water is maintained at the requisite temperature by the use of a gas-fired "Ideal" boiler. The effect of this process is to dissolve a thin film of glass from the surface of the ware, giving it a highly polished finish.

All these processes, in which gas plays such an all-important part, result in objects which combine all the well-known qualities which the name Stourbridge cut crystal conjures up in any connoisseur's mind.

In conclusion, I desire to thank the President, Mr. S. J. D. Williams, for giving me the opportunity to present this paper, and also the managements of all the glassworks concerned for their kind co-operation at all times.

DISCUSSION

Mr. **S. J. Sadler,** Vice-President (Solihull), congratulated the author on the improved results obtained since his paper of four years ago. He noticed that some of the furnaces were described as being fired by producer gas from coal. What kind of coal was used? Was it anthracite? If not, did the manufacturers experience trouble with sooting of flues, &c.? Why was coke not used? Was it because there would be a higher sulphur content in the producer gas? According to the statistics given in the paper, the ratio of heating costs was approximately one for coal, 1.25 for oil, and 1.5 for gas. At first sight it would appear that gas would be prohibitive, yet the author stated that he had convinced the glass makers that gas was the most desirable fuel. It would be interesting to have a summary of the advantages claimed for gas which had helped to make out a convincing case.

With regard to the thermal efficiency of furnaces, obviously owing to the different ways of working the furnaces the efficiency must vary; was it possible to give figures for the various types of furnace working under average conditions? The main hope of reducing fuel costs being by increasing efficiency, it would appear that a great improvement could be obtained by greater heat insulation and utilization of the high-grade heat being lost from the stack. A number of the processes requiring heat could be provided with waste heat, such as desulphurizing plant, annealing, acid polishing, and water heating. In his opinion the heat could then be used for generating steam and the steam used for water heating; for example, the water jackets of the acid washing plant and the hot water for heating buildings, &c. Desulphurizing was interesting to gas engineers and a brief description of the plant would be welcomed. It had been described in Mr. Tomes's paper in 1944, but at a cost of about 0.5d. per therm it would be a heavy burden to a gas undertaking for general practice. Was it to be assumed that it was this desulphurizing which gave gas such an advantage when used as a fuel for uncovered pot and tank furnaces? Finally, he asked for a description of the intaglio method of decoration, and enquired whether any decorating was done by etching nowadays.

Mr. **Tomes,** in reply, said the furnaces were not fired by anthracite. The coal used was bituminous non-caking, usually double screened nuts, washed preferred, being obtained from the Cannock and Highly coalfields which were not far distant from the Stourbridge area. With regard to sooting of flues, no trouble was experienced with the internal producers, but with external producers it was usual to burn out the producer gas main running from the producer to the furnace, each week. Coke was not used for the very simple reason that only one glass-works in the area had steam available for this purpose. With regard to the advantages of gas over other types of fuel, compared with coal its advantages were well known, *e.g.,* reliability, no handling or storage requirements, constant C.V. and S.G., its ease of control, labour saving, cleanliness, &c. With regard to oil: (1) Cleanliness in both handling and combustion; (2) preheating of the oil required; (3) pumping of oil may be necessary if a gravity feed is not employed; and (4) power cuts present a problem particularly in respect of the air compressors for atomising, and finally the high capital cost incurred with oil due to storage requirements and also making a suitable entrance to the works to accommodate the large tankers.

With regard to thermal efficiency of the furnaces—the efficiency of multi-pot furnaces was only in the region of 5%, the loss at the pot mouths being up to 30%, depending on the method of working. Efficiency of a tank would be anything from 10% to 15%, depending on its size. Works in the Stourbridge area aimed to get a figure of 1 to 1.3 tons of coal per ton of glass. One to one would be considered a very good figure indeed. With a tank 0.3 to 0.5 tons of coal per ton of glass might be obtained, although this depended entirely on its size and method of operation. By the use of efficiently operated tank furnaces instead of pots therefore they would expect a saving of about 200% which would on present prices be ample to assure them of the melting load. It was not necessary to use desulphurized gas on tanks and it would be appreciated that in this field for their particular type of ware neither coal nor oil could compete in view of the cleanliness demanded of the fuel employed. With regard to heat insulation and utilizing waste heat, heat losses occurred on multi-pot furnaces, due to: (a) Radiation from the working furnace; (b) stack losses; (c) radiation from the main structure. A modern furnace was insulated to its limit. If any further insulation were added it would have a serious effect on the life of the refractories. Waste heat boilers could not be employed since the temperature of the gases leaving the recuperator was often as low as 300° C.

Regarding desulphurizing, Mr. Tomes outlined the method of removing sulphur by the conversion of the sulphur compound to H_2S. He went on to say that the major alteration to the plant since their installation some five years ago consisted of the addition of a further purifying box so that the sequence of the plant was now as follows—booster, purifier, converter, atmospheric cooler, and purifier box. It was found that the converter was sensitive to oxygen changes in the gas and tended to heat up very rapidly if this was increased for any reason. By placing this purifier box before the converter therefore the oxygen was extracted and used to revivify the box. After a time the boxes were reversed so that a continuous cycle of revivifying and sulphiding took place. The purpose of this was two-fold: (a) It increased the life of the purifier; and (b) it served to maintain a constant minimum oxygen figure at the inlet to the converter. As already stated, desulphurized gas was not necessary for use on a tank furnace, but he was not able to go further into the matter at the present for obvious reasons.

Decorating moved in fashions and little etching was carried out to-day. Intaglio was done with a smooth stone wheel which contained the properties of a cutting, roughing, and smoothing stone and thus completed the decoration in one operation. The maximum diameter of the wheels was 6 in., being much smaller than those used for cutting and the design carried out was much more delicate. Actually it might be described as cutting carried out in one operation, but not to the same depth.

Mr. **Cook** (Managing Director of Stuart's Crystal Glass Company) further explained the process of intaglio decoration.

Mr. **Fras. C. Briggs** (Dudley) said the paper was a factual record of the application of gas in a very interesting industry, but it obviously did not touch many of them. We could confirm what Mr. Tomes had said about the value of gas in the processes he had described. It was delightful to hear of what gas was doing in an industry which provided things that were not only useful, but which added beauty to the home, and which were now helping to earn dollars. The paper was delightful for many reasons; not least because Mr. Tomes confessed his failures as well as his successes. Few gas engineers had the pluck to do that, but it was valuable in saving the time of other workers. It was also illuminating to see how the price of fuel was not always the main consideration. It was right that they should strive to sell gas as cheaply as possible, and presumably those who would be in control of the industry in the future would wish that state of affairs to continue, but in spite of the fact that gas was the dearest of the fuels mentioned in the paper it had "got away with it." Where the fuel cost was not a very big proportion of the total selling cost it was quite easy to demonstrate that though gas was dearer than other fuels it was the best in the long run.

Mr. **C. R. Ingham** (Cheltenham) said one strong objection to the use of oil was the amount of impurities in the fuel. His reason for being interested in the matter was they they had been using oil—about 30 tons a day—at Cheltenham for the manufacture of carbon black, and they had had evidence of the impurities which it contained.

Mr. **T. F. E. Rhead** (Birmingham) said the paper had shown what could be done with gas in a very artistic form of industry. It was realized that specialized refractories were used, and he suggested that it would be interesting if the author could say something about them.

Mr. **Tomes** replied that silimanite was the principal refractory used, and for the benefit of those who were interested he had a small tank unit available for inspection.

Keenness and Ingenuity

Mr. **H. R. Hems** (Birmingham) said the paper was of the type which those who had the responsibility of developing the industrial load appreciated to the full. It was not the first time that Stourbridge had contributed, with the necessary reservations, to the general fund of information. The paper recorded so fully the practical experience of the application of gas, particularly to large glass melting propositions, that it was difficult to discuss, the experimental work being on such a scale that it was futile to suggest alternative methods. No doubt many possibilities of carrying out the conversions before the actual experience described was proceeded with were considered.

Stourbridge was fortunate—or unfortunate, depending on one's viewpoint—in having a stable glass industry, and he paid tribute to the keenness and ingenuity which had been displayed in developing the industrial load in that direction. The agreement of the Working Party and the industry that the best fuel was town gas or coke oven gas put the seal on this work. The Working Party's agreement, he was satisfied, was confirmed by many other industries, as was evidenced by the huge demands which had been made on the industry for industrial supplies. Probably the experience of Stourbridge in the glass industry was comparable with the experience of Sheffield in the steel industry and, say, Stoke-on-Trent in the pottery industry. Those serving undertakings with a diversity of industrial problems had to make a special effort to go into detail with some of the trades with which they were concerned, whereas a large portion of the energies of Stourbridge had been devoted to one industry.

They had evidence of the close relationship existing between the gas undertaking and its consumers on the occasion of the summer

visit to the glass works at the invitation of the President. Personal contact could not be emphasized too much and he hoped that nothing in the working arrangements under the new régime would interfere with that, or the enthusiasm of the staff responsible for the development of that type of load.

Two outstanding features in the paper connected with glass melting were the suggested replacement of the multiple pot furnaces by individually heated pots and tanks. Since Stourbridge became closely associated with the Birmingham Industrial Centre —and even prior to that—they had taken advantage of their experience on glass problems. They had been able to follow closely the gas applications to the single pot furnace and some interesting experimental work had been carried out with the "C.C." burner, as mentioned by Mr. Tomes. While the comparative cost figures for melting still showed town gas higher than the other fuels mentioned, there were other advantages which could not be set out on a monetary basis, of which the potential users were obviously fully aware, as they were pressing for supplies.

Two points in the description of the single pot furnace were worthy of emphasis: (1) The necessity for production of glass of a sufficiently high quality to satisfy the local trade; and (2) that no separate pot arch was necessary, as the pot was pre-heated and went straight into production without movement.

A Birmingham Example

As a contribution to the study of this subject he referred to a Birmingham experience of pot arching, in which the furnace was a down-draught kiln capable of accommodating two glass pots. Originally the burners were of the air-blast type. Twelve were fitted to each side of the furnace—24 in all—and these were fed by four mixture control devices situated at the back of the kiln. The air supplied was obtained at about 1½ lb. per sq. in. from a rather noisy blowing fan which was located on the top of the furnace. A nine-day arching cycle was employed and this involved extremely precise temperature regulation. Although the burners were supplied from four controls, regulation was difficult to achieve and as a result the pots were frequently spoiled in the arching process. In addition the burners were somewhat dangerous in use, since all the controls were located at the back of the furnace and the operator could not see whether the burners were alight; consequently on lighting up minor explosions were of somewhat frequent occurrence.

As a result of a complaint concerning the burner system they suggested that neat gas burners should be fitted, and the system had proved extremely successful. Although the furnace had been working for over nine months there had not been a scrapped pot and pot life in the melting furnace had been considerably extended. The maximum temperature in the furnace after the nine-day heating was 1,100° C. The furnace working space measured 3 ft. by 1 ft. long by 4 ft. high, and the approximate gas consumption for the arching cycle was 235,000 cu.ft. The 24 air blast burners had been replaced by eight neat gas burners, each passing 300 cu.ft. of gas per hour, and in view of past experience they had fitted a separate pilot light to each burner and provided flame failure equipment.

The author's reference to tank furnaces and lehrs had recalled to his memory some very early work at Birmingham on a high pressure gas-heated tank for the production of very cheap bottles. It ran very successfully for a number of years. On lehrs, one of the earliest applications of industrial gas at Birmingham was a 60 ft. lehr at the works of Messrs. Osler, then in Birmingham. Glory holes for finishing had gone through many changes of method of burner application, including straight firing and recuperative methods. The one illustration shown in the paper indicated the use of the "C.C." type of burner, which appeared to be very satisfactory.

In the Main Industrial Committee they were very concerned about the appearance of gas-fired plant, compared particularly with plant produced for using electricity, and he thought, although he appreciated the difficulties, that there was room for improvement in external appearance. One picture of a lehr showed end-firing arrangement, although some preferred the side-firing arrangement. The reference to cutting off and edge fusion, bringing in the Bornkessel or Marshall types of burners, showed an application in which gas was paramount. Such machines were used extensively in the electrical trades connected with the manufacture of lamps, both in this country and on the Continent. It would be remembered that this was one of the applications which gave them headaches during the war, as it was found practically impossible to replace town gas with producer gas. To complete the story, reference should be made to the many gas furnaces in use for glass bending. It would have been interesting to have had figures of gas consumption used by the glass industry as a whole at Stourbridge. He had little doubt the paper would be read with interest and used in a far wider field than the area represented by the attendance at the meeting.

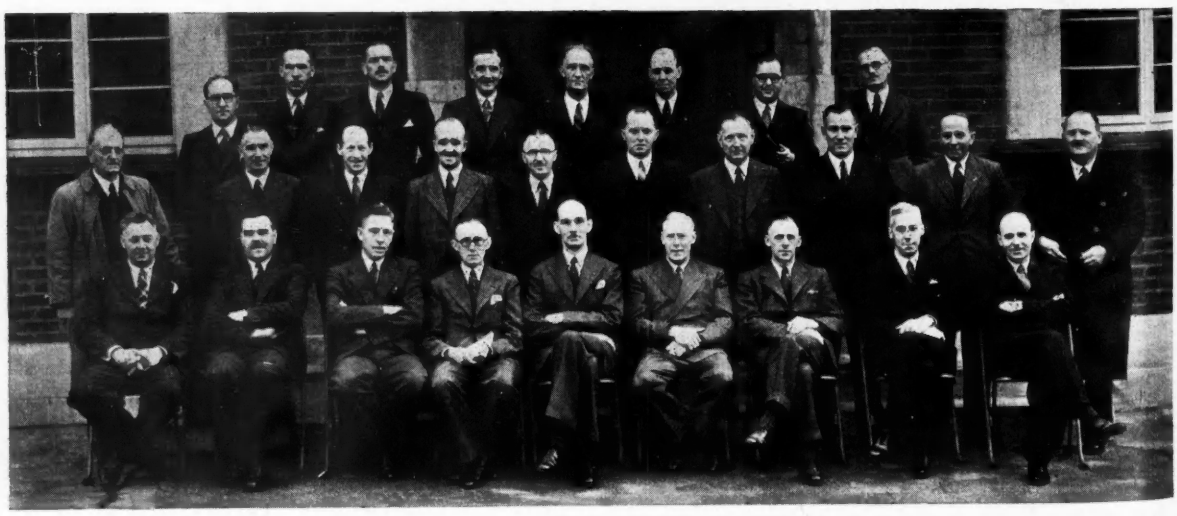
Mr. **Allen** (West Bromwich) said glass manufacturers were convinced of the practicability of using town gas and were anxious to use more as soon as it became economically available. In addition to giving comparative costs, Mr. Tomes had shown the importance of personal contact and selling ability on the part of responsible officials.

Mr. **A. B. Britton** (Hinckley) proposed a vote of thanks to Mr. Tomes for his interesting paper which, to his mind, was an example of how research had led to final success. Although no detailed technical reports had been included, the paper served as a sufficient invitation to neighbouring gas engineers to visit Stourbridge and see how the problems of the application of gas to the glass industry had been solved.

Mr. **P. Dougall** (Kidderminster), in seconding, said Mr. Tomes was fortunate in working in a town with a staple industry which was capable of making efficient use of gas. In his own case, the staple industry of the town—carpet making—did not lend itself to any substantial utilization of gas.

Mr. **Tomes** briefly replied to the vote of thanks and invited the members to inspect a selection of samples of Stourbridge glassware displayed on the Chairman's table.

Middlesbrough Corporation has accepted the tender of W. C. Holmes & Company, Ltd., Huddersfield, for the supply of valves and connexions for the station meters for the new purifying plant at the gas-works. The tender of Cochranes, Ltd., Middlesbrough, has been accepted for the supply of pipes and specials.



Our photograph shows members of the South-Western Gas Salesmen's Circle who visited the Gothic Works of R. & A. Main, Ltd., on Oct. 13. Included in the photograph are Mr. O. Pincock (Weston-super-Mare), Chairman of the Circle, and Mr. C. Marley, Director.

THE FUTURE OF COKE MARKETING*

By J. O. COOKE, B.Sc., M.I.Mech.E., A.M.I.E.E.,
General Manager, London and Counties Coke Association

THE year 1948 is a year of transition particularly for the gas industry and, although I was extremely gratified when your Chairman did me the honour of inviting me to present a paper to you on the future of coke marketing, I felt that it might be difficult to obtain your interest in a subject on which it is perhaps difficult to say anything new and which under present circumstances must necessarily contain a strong element of crystal-gazing.

The industry is facing nationalization and it is a time of uncertainty, anxiety and change—change which is a challenge to the skill, experience and public spirit of engineers and managers. We are fortified by our great tradition of public service and enterprise which we have built up over the years. Now that the decision has been taken it is certain that all prejudice will be dropped and the industry will face up to the problems and difficulties objectively with a determination to make a success of the new organization.

Is 1948 the turning point in our national troubles? It might well be—there are signs that the country is beginning to face up to facts. Although we are still behind, the results achieved in the last 12 months by workers and by management are encouraging. Coal—the key to it all—is more plentiful. Its quality and price leaves much to be desired, but we are now getting enough for our needs and improvement in quality will come. The world oil position has enforced a more rational outlook on the manufacture of carburetted water-gas and the production and availability of gas coke has returned to normal. Nothing is more certain than that we are going to have to sell coke again instead of rationing it.

In the new order of things the user is to retain the right of choice of fuel and nationalization will not cure a product of the weakness of having to be sold. The mistake is not being made of ignoring the stimulus of competition and it is plain that the new nationalized industries are going to have to devote more and more effort to development, consumer service, and publicity. The money—the country's money—so spent will yield the nation handsome dividends in efficiency and progress. The industry in the past has built soundly on sure foundations. In the fields of gas, coke, and by-products, national and district organizations and machinery have been developed and over the years a big store of experience gained which will be of the utmost value to the new national gas organization.

Development of Organized Marketing

The place of gas coke in the nation's fuel supplies and the important role it plays in the economics of the gas industry should be fully understood both by those who have the making of laws and by those to be responsible in the future for co-ordination in the field of fuel and power. Coke is the most important by-product produced by the gas industry and furnishes about one-third of its revenue. From the standpoint of efficiency of coal utilization it should be borne in mind that the industry markets two therms in the form of coke to every therm sold as gas. Although coke is the residual of the gas-making process its quality, sizing, and uniformity are of paramount importance, not only for its proper usage but for its general acceptance as a high-class fuel suitable for its purpose. It is made from a wide variety of coals by differing methods of carbonization which produce cokes with differing characteristics.

Turning to usage, it is not always appreciated outside the industry that there are generally speaking two separate and distinct coke markets—that for blast furnace and foundries supplied by coke ovens operated almost exclusively by producers outside the gas industry, and the general industrial and domestic coke market, the term domestic including space heating in the widest sense. The general coke market is supplied by gas coke, which represents about 70% of the supply in those markets, and by the hard coke surplus to blast furnace and foundry requirements plus the grades and sizes of hard coke unsuitable for metallurgical use.

The national character of the general coke market is not always properly understood. Very few districts are self-sufficient so far as coke production and consumption are concerned. In most areas incidence of production and consumption are out of balance, surplus production areas traditionally selling part of their production in shortage areas or in overseas markets. Further complications arise as a result of the selling in all areas of small-sized hard coke and in ordinary times by the unloading of surplus large hard coke. It should also be recognized that the general coke market of to-day has been substantially created by the foresight and enterprise of the gas industry. It is never static and is only held for coke in face of strong competition by continuous and energetic development work in the various fields of utilization, by progressive improvement in coke quality, and by efficient consumer service both regionally and nationally.

* Paper presented to the Southern Association of Gas Engineers and Managers (Eastern District) on Oct. 19.

London Coke Committee

Since the first world war the gas coke supply position and the conditions under which it is used have been revolutionized, almost entirely as a result of co-operation by the industry in organized co-ordinated marketing. The gas industry which 30 years ago found its coke almost unsaleable has cultivated markets for every ton of coke it can produce.

Before the 1914-18 war gas coke as then produced was difficult to sell even at very low prices. It had little domestic use and its indifferent quality and variability limited its industrial use. Largely neglected by the producer as a residue of the gas-making process and disliked by the user who, with few exceptions, had little or no knowledge of how it might be utilized it was perhaps inevitable that from time to time chaotic and ruinous conditions obtained in the coke markets. Gradually it became manifest that if the industry was to survive a definite national coke policy was essential and producers would have to co-operate in an organized effort to educate users and to overcome general prejudice and to find new uses and markets for coke.

It was in 1913 that the London Coke Committee was conceived and formed by nine of the leading London gas companies under the Chairmanship of Sir David Milne-Watson with the object of enhancing the value of gas coke as a fuel by improvement in its quality and by developing appliances and methods for its effective utilization. The Committee succeeded in educating domestic and industrial consumers in the way that coke could be used and in producing appliances in both fields of usage which have since been developed and have become widely employed. At the same time a new conception in methods of gas manufacture was gradually established with the aim of choosing coals for carbonization with the two-fold objective of good gas yield and production of coke of suitable quality. The value of coke was raised by closer screening to size, removal of breeze, and reduction of moisture by improved methods and closer control of quenching.

This pioneer work was not entirely confined to the London area and recognition should be given to certain other large gas undertakings for the valuable development work carried out in the fields of preparation, organized marketing, and technical development.

The results achieved amply demonstrated to the industry the value of co-operation in orderly coke marketing and it became apparent that if the desirable conditions of coke utilization were to be developed and become more widely available the scope of the Committee would have to be enlarged. Accordingly in 1931, on the initiative of your own Southern Association, the London and Counties Coke Association was brought into being, embracing 15 counties in the south, south-east, and the east with the following objects:

(i) to promote the use of coke as a fuel for domestic and industrial heating purposes;
(ii) to improve the standard of quality and the sizing of coke;
(iii) to co-ordinate and regulate the price of coke within the area of the Association.

The purpose of the Association was to improve the status of the coke markets and the revenue gas undertakings obtained from the coke they produced for sale. In this connexion it must be remembered that the gas industry operates under statutory control and that this policy is in line with its declared policy to supply gas at the cheapest possible rates. The revenue obtained from its residuals becomes increasingly important from this standpoint.

It may be fairly said that both the London Coke Committee and the L.C.C.A. have been fortunate in having successively as their

Chairman Sir David Milne-Watson, Mr. Robert Foot, and Colonel Harold C. Smith, three of the most able leaders produced by the gas industry in its long history. Sir David was, of course, the prime mover in the formation of the London Coke Committee and its first Chairman but did not actually hold office with the L.C.C.A. Certainly the satisfactory position in the coke market which quickly became established within the area of the Association and the extent to which coke came to be used both in the home and in industry was a striking justification of the policy followed and a testimony to the energy with which it was pursued. New markets were promoted, improved and more effective appliances were developed. A central technical service was maintained—without charge for consumer, producer or merchant—aimed consistently at greater efficiency in utilization. An economic marketing structure for the rational distribution of coke was evolved, uniform throughout the Association's area and fair to consumer, producer, and distributor alike. A working alliance was built up with the merchants and factors.

The National Federation

The work naturally extended and by the end of 1938 district coke associations had been formed to cover practically the whole of England and Wales. With the development of the district associations the need for national co-ordination and co-operation quickly became evident and early in 1939 the National Federation of Gas Coke Associations was formed to represent and further the interests of the gas coke industry as a whole and in relation to other industries.

The main objects of the Federation are:

(i) to co-ordinate and carry out technical research;
(ii) to co-ordinate and carry out publicity;
(iii) to promote by every means the development of the coke market;
(iv) to regulate the price of coke within the United Kingdom;
(v) to co-operate with other Associations and bodies interested in the production, supply or use of fuel in general and coke in particular.

Time does not permit of any detailed survey of the activities of the Federation over the seven or eight years of its existence. In 1940 a working arrangement was reached on coke marketing with the hard coke producers through the British Hard Coke Association, and the Federation also joined with the South Wales Anthracite and Dry Steam Coal Committee in the Government-sponsored campaign on fuel economy and efficiency. This co-operation with the other two smokeless fuel industries continued to develop on both marketing and technical matters and culminated in 1944 in the formation of the Solid Smokeless Fuels Federation as a common platform for the promotion and development of the use of solid smokeless fuels.

On the technical development side a Gas Coke Federation Technical Committee was formed in 1943 as a national forum for the discussion of technical matters. This Committee provides a central pool for the industry for the production and dissemination to the District Association Technical Committees, and through them to all gas undertakings, of technical information and data relative to the production and utilization of coke.

The Approved Coke Burning Appliances Standards developed by the L.C.C.A. and first issued in 1938 were taken over by the Federation in 1944 and an Appliances National Committee representative of the various District Associations was formed to take charge of and to continue this work. The Approved Coke Burning Appliances handbook now issued by the Federation is an outstanding achievement in the technical field, and provides individual coke producers and distributors with full information in regard to the latest developments in methods of utilization. The Committee co-operates with the manufacturers in the development of new and improved coke burning appliances. Such appliances are only included in the Approved List after compliance with the Federation's standards has been proved by actual test. The Approved List incorporates a detailed specification for each appliance, together with other technical data and recommended coke sizes. It is interesting to record that the Federation Appliances Committee takes an active part in the work of the Ministry of Fuel and Power Committee dealing with the testing and approval of appliances for installation in low-income group housing.

Future Coke Development

On the commercial side, the Federation, without interfering with the autonomy of the District Associations, has been of great value in the co-ordination of methods of distribution and in the development of a constructive national coke marketing policy. That brings me to what I believe to be the most important single piece of work carried out by the Federation—its post-war planning report on future coke development, which has been unanimously adopted by all the District Associations. As the matter dealt with in this report is of direct concern to the subject of this paper, I propose devoting a little time to outlining the recommendations, many of which have already been put into operation.

The report, which was largely based on the experience of the District Associations and in particular that of the L.C.C.A., advised the development of fully autonomous District Associations each independently pursuing an active and constructive gas coke policy—a policy in main outline shaped nationally and commonly agreed but adapted and modified in minor detail by each district to suit its own particular conditions.

The report also affirmed the need for an active central National Gas Coke Organization formed by nomination from each District Association with the following functions:

(i) to act in an advisory and co-ordinating capacity on both commercial and technical matters;
(ii) to assist in solving problems arising between districts and to help when production and consumption get out of step or are subject to dislocations caused by trade cycle fluctuations; and
(iii) to act for the industry as the natural negotiating body with competitive industries and with Government and other national organizations.

It was recommended that each District Association should in its own area:

(i) negotiate an agreement with the independent distributors in the area and in conjunction with them build up a marketing structure for gas coke;
(ii) arrange to co-operate with producers of hard coke and other competitive fuels in the area on marketing matters;
(iii) set up a Technical Committee representative of the undertakings in the area with a full-time officer to deal with technical development in regard to production and utilization of coke and to co-operate in the national technical development work.

It was considered that future coke marketing should be based on service to the consumer requiring much more specialized and technical knowledge and more expenditure of time and energy than had hitherto been devoted to it. Coke should be presented to the public as an efficient manufactured fuel, not as a waste product. The industry—the largest producer of smokeless fuel—should take the initiative in appliance design, develop the prototypes to the desired efficiencies, and secure the co-operation of the appliance makers for their introduction. Close working arrangements should be established with heating engineers and others responsible for the installation of fuel burning equipment. Constant attention should be given to improvement of coke quality and sizing.

Fair Price Structure

Assistance should be given from both district and national bodies in the development of coke markets locally in the areas where the coke is produced. Each gas undertaking was recommended to form a coke sales department and to display coke and coke appliances in its showrooms. Both gas and coke salesmen should be trained to be two-fuel minded so that each was alive to the respective uses of the fuels and was encouraged to see that each fuel was appropriately placed. Each coke association was recommended to set up a fair and economic price structure related, of course, to the price of competitive fuels and based on the consumers' price delivered to his premises with just and reasonable merchants' margins. From this, by deduction of the approximate cartage rates, *ex*-works and *ex*-station prices were to be obtained county by county throughout the Associations' areas and in the fixed price schedules built up. The schedules should allow graded concessions to large buyers and also provide for an additional charge for delivery in hundredweight lots.

It was considered that the district associations could not function fully without a co-operative working arrangement with the distributors and it was recommended that each association should enroll all coke distributors in the area in a Coke Distributors' Branch, the basic principle being that such distributors should be prepared to give consumer service and undertake to observe the schedule prices and rules of the association. Finally, each association was advised to consider the setting up of an internal pooling arrangement within its area for the regulation of shortages and surpluses.

Despite the conditions which have obtained since the end of the war with the continuance of coke programming and the Government controls many of the recommendations of the Report on Future Coke Development have already been put into operation. The Federation machinery has been working for some time. The organization of certain of the associations is not yet complete but in some districts a more or less complete organization with the necessary price structure has been working successfully for some years. Despite the changed circumstances and the time that has elapsed since the preparation of the report of the Federation, the findings and recommendations in regard to coke development, utilization and marketing are still fundamentally, and in broad principle, sound. Indeed the present economic position, the changed pattern of industry with its tripartite partnership of employer, employee, and Government, and the integration and centralization in other branches of the fuel and power industries seems to add new urgency to the need for vigorous action along the lines recommended.

In view of the impending nationalization of the industry, the question presents itself as to how does this organization fit into the concept of a nationalized industry.

It would, of course, be foolish to make any definite assumptions as to the type of organization that will be developed by the Boards in the various areas. It seems safe, however, to say based on the experience of the largest existing undertakings that some form of decentralization appears to be inevitable.

In the Committee stage of the Gas Bill, Mr. Gaitskell said that there was no reason for anticipating over-centralization. The Boards would almost certainly feel that they ought to have sub-units or areas of management and that the individual Boards would have to make out and apply the appropriate structure for their own area requirements. The pattern of this sort of organization seems specially well-suited to bringing into being quickly the type of regional structure recommended in the report. On the national level, too, there seems to be no insuperable difficulty in maintaining the present national machinery for dealing with coke and for continuing the valuable consultative and advisory service which has contributed in no small measure to the present flourishing position of the coke market.

I have spent some little time looking backward and outlining the development of organized coke marketing from the formation of the London Coke Committee to the present day because it seems to me that from the standpoint of organization, procedure, and method the industry has built soundly and that, no matter what form the ownership of the industry takes, the present national and district organization is fundamentally the best form for the efficient marketing of coke in the future.

Future Position

The recommendations of the General Committee of the Federation on future development were based on four main assumptions.

1. That the gas industry would continue to produce coke for sale for a number of years to come.
2. That the capacity to produce coke, particularly in the coke oven industry, would be considerably greater after the war.
3. That some of the wartime markets would cease to exist after the war.
4. That in the post-war period there would be a greater potential demand, particularly in the domestic market, for suitable smokeless fuels.

The prime purpose of the gas industry is to produce gas at a competitive price. No process has been developed for economic gas production without a consequential production of coke which would allow the gas to be sold at prices enabling it to be used for purposes for which coke is now used. There seems no doubt that for some time to come the industry must continue to function as a two-fuel industry. The demand for gas is growing steadily and seems likely to continue to advance. The Ministry has indicated that gas-oil may be in short supply for some years. It will almost certainly be dearer. It was to me surprising that doubts were expressed at the Institution Summer Meeting as to whether the demand for coke was likely to increase to the same extent.

The Simon Report, officially adopted by the Government, recommends the use of solid smokeless fuel as the mainstay of the domestic winter space and water heating load, and the potential market in this direction could easily absorb the coke resulting from a gas production more than treble that at present. There may be fears that a substantial increase in coke consumption in the domestic field would handicap legitimate gas development, but is that so? I must not dwell on this matter. Mr. F. M. Birks, in a recent address, emphasized the need for solid fuel to meet the winter peak domestic load. The coke it produces is of great value to the gas industry. Using modern appliances, a combination of gas and coke—both smokeless fuels—provides the domestic householder with his total requirements of heat for space heating, water heating, and cooking with a high degree of thermal efficiency and at a lower cost than can be shown with any other fuel or combination of fuels.

Present Coke Markets

It would be true to-day to say that as a result of wartime and post-war shortages gas coke markets are at sixes and sevens. Coal quality has deteriorated to an alarming degree and undertakings are no longer able to choose their coals. As a consequence, generally speaking, coke quality is poor although there are exceptions. Solid fuel has been rationed with, in some directions, no certainty of getting your ration. Its competitors have been free. Coke has been in short supply and the trade seems to have temporarily forgotten the art of selling it. Prices are high and in the domestic business suppliers have, in company with most branches of the distribution trade, forgotten that they are the servants of the public with a definite responsibility to the consumer. New markets have certainly been obtained, mostly at the expense of anthracite and hard coke required for other purposes. It is doubtful though whether the industry will be able to retain any appreciable quantity of this business unless there is a marked improvement in coke quality.

It is a gloomy prospect, but we must face up to the fact that as a result of the restrictions and difficulties of the last nine years, some of the users' confidence so hardly won over the previous decade, has been lost.

Let us look for a moment at our competitors. Hard coke production is nearing the almost record level of 14 mill. tons per annum. In view of present requirements for blast furnaces and foundries, there is little doubt that the capacity of the coke oven industry will continue to expand. Sooner or later the demand for iron and steel will slacken and the hard coke producers will have to find new markets for their products. There is too the undoubted trend in the iron and steel industry towards self-sufficiency in regard to coke, which will release the bulk of the hard coke production from N.C.B. and non-vested coke ovens for the general industrial and domestic markets. We must reconcile ourselves to greatly increased competition from hard coke.

The position in regard to coal and anthracite is well known. Present shortages of large coal and anthracite arising from export requirements have created conditions temporarily in favour of coke, but there is no permanence in the advantage. Wartime and post-war price increases imposed mostly on a flat rate basis of 15s. a ton on coke for every 10s. a ton of coal, have produced an unbalanced and unrealistic price structure for coke and for the various grades of coal. Coke to-day is too dear, and has very largely lost its pre-war competitive place with other fuels. The N.C.B. intend to bring in a new and rational price structure as soon as possible in order to redress the unbalanced position in regard to the various grades of coal. We have already seen the first instalment of this scheme which places a further handicap on gas coke in relation to other solid fuels.

Coming now to fuel oil, the outlook is perhaps less alarming. A halt has been called by the Ministry to their oil conversion programme which, however much it might be justified in 1946-47, could hardly be maintained under present-day conditions. Nevertheless, an impetus was given to increased use of fuel oil which will be difficult to check, particularly in view of the development in the country of oil refining. There seems to be little doubt that the long-term prospect—not only in this country but the world over—of any general expansion in the use of oil for heating purposes is highly problematical. American consumption of fuel oil has increased enormously and very much outgrown its own production. Hard currency countries are now buyers of fuel oil and it seems so obviously right in the national interest to save dollars and to use our home-produced fuels. There are, of course, certain special usages which justify the importation of oil but few in directions where gas coke is competitive.

Restoring a Balance

Turning to gas and electricity, there is little doubt that the present greatly enhanced level of consumption is in some measure due to the freedom from restrictions on use they have enjoyed since 1939. The increased purchasing power of the public, coupled with the general shortage of consumer goods in the shops, have established conditions favourable to this change which has largely taken place at the expense of coal and coke. A return to normal conditions in regard to availability of consumer goods and a plentiful supply of suitable solid fuels free from controls will no doubt do much to restore the balance in this direction.

It is to be hoped though that the new Government authority co-ordinating the activities of the fuel and power industries will bring a little sanity into certain aspects of this wartime development in the domestic field. It is not much use criticizing the old-fashioned open coal fires on the grounds that they only provide about 20% of the useful heat of the coal and to accept, say, the large-scale installation of electric immersion heaters having a coal efficiency of 12%.

Consider for a moment the potential demand to-day for gas coke. The total quantity produced for sale, excluding breeze, is of the order of 9 mill. tons a year and approximately 3 mill. tons is consumed in the carbonizing process. Of the tonnage produced for sale, about 2½ mill. tons is sold in the industrial market, 4 mill. tons in the small industrial and quasi-domestic markets, rather more than 1¾ mill. tons in the domestic market, and the remainder is exported. Over the country about half of the coke produced for sale is sold through merchants and factors.

Can all these markets be held for gas coke and are any of them capable of expansion?

The industrial, small industrial, and quasi-domestic markets, in which about two-thirds of the coke is sold, cover a very wide variety of usage in heating, steam raising, and process work. In these fields the position is not entirely satisfactory and the competition from coal in boilers using automatic stokers and from oil is extremely keen. Quite apart from the unfavourable wartime and post-war price changes, it is clear that shortage of labour and increased wage costs have placed a premium on fuel-burning appliances which are both automatically controlled and mechanically fired. In these directions we have not been too well placed and the mechanical firing of coke and breeze in traditional types of shell boilers and central heating boilers is now under active investigation together with automatic control methods. Developments are pending and there is every hope that modified and new appliances will be evolved which will enable the industry to match the efforts of our competitors. I cannot leave the industrial field without a reference to the large potential market for coke which exists in the development of coke-fired industrial furnaces and driers. It is a fact that compared with other fuels we can show considerable savings in capital and over-all running costs without prejudicing convenience, in applications such as the drying of grain, grass, minerals such as chalk and various other materials. Development work is also in progress to enable other foodstuffs to be direct-dried without fear of contamination.

I would also like to mention the question of breeze which from time to time presents an embarassing problem to the coking industries. The total annual breeze production is of the order of 2¾ to 3½ mill.

tons per annum, and its present market value varies between 30s. and 50s. a ton, depending upon the usage. The breeze markets are extremely sensitive and are closely related to the availability of coal slacks. Costs of transport largely govern its disposal but perhaps the most important single factor influencing the demand for breeze is the sporadic character of the supplies. I know there are exceptions to this and that in certain cases there are satisfactory long-term contracts. There seems little doubt that the best single outlet for breeze is at gas-works and in power station boilers either burnt with slack or alone on chain grate stokers. For the immediate future, under present electrical load conditions the power station usage may not be generally practicable and it may be that we shall have to find supplementary, or alternative markets. We are hopeful that the new appliances now being developed both in the industrial and the central heating fields will provide these markets but we must bear in mind the need for proper co-ordination of supplies.

So far as domestic demand is concerned, the adoption by the Government of the recommendations of the Simon Report and Government action in securing the installation in all new housing of appliances capable of burning smokeless fuel is laying the foundations of a great potential demand for coke. The establishment by the Ministry of Fuel and Power in connexion with new housing of an Approved List of Solid Fuel Burning Appliances, most of which are capable of burning coke, is gratifying to the gas coke industry and is a logical development of the pioneer work they have carried out in this field of utilization. In the interests of fuel efficiency and smoke abatement, the Government must be persuaded to extend their policy to include the replacement in existing housing of the old-fashioned, inefficient, smoky appliances by new smokeless appliances conforming to modern standards of efficiency. Even if this policy was restricted to urban areas it would apply to a very high percentage of the houses in the country which, in urban areas alone, amounts to about 10 mill. houses.

While there is room for an enormous expansion of coke sales in the domestic field, many questions are raised by it, and many changes must be made to allow of its proper development. There seems no doubt that the present policy of providing special appliances to burn the existing range of gas cokes as made to-day is a correct one, but should it be supplemented by the manufacture of specially reactive cokes for use in old-fashioned coal type domestic grates? A big section of the public certainly prefer an open fire in the living room and experience has demonstrated the popularity of these special cokes. It is a problem. The future availability and price of gas coals and the use of low rank coals are relevant to the question as well as the problem of dealing with double coke stocks.

We must keep a close watch on the new housing developments. With few exceptions appliances capable of burning coke are being installed, but present building policy seems to be away from the independent domestic boiler to open fires or openable stoves with back boilers. If continued this will disturb the balance of the sized-coke market and increase the demand for broken coke at the expense of nuts. The domestic market is a lucrative one but under present conditions it is questionable whether the industry can afford to rely too much on the domestic load which is highly seasonable and subject to fluctuation depending upon the severity of the winter. A balance between domestic and industrial markets is essential if even loading is to be preserved.

These and many other similar problems will have to be resolved by the new national organization, but mention must also be made of the gas coke export trade which was resumed in the early summer. The industry had over a number of years established markets for coke in Europe, particularly in Scandinavia. Between 1940 and 1948 these markets had been largely supplied with hard coke and a somewhat difficult position obtains to-day. The movements of solid fuels between countries in Europe is programmed quarterly by the Coal Committee of the Economic Commission for Europe, which is representative of all European countries. The British Government is represented on this Committee and arrangements have now been made for the British coke producers to participate in this trade in which the question of quality is of paramount importance. Provided that we make available coke of good quality there seems to be no reason why, for some time to come at any rate, despite the expansion of Polish production and the recovery of the Ruhr, we should not continue to do good business in this field.

New Situation to Face

We now come to the new order of things, and it is patent to all that we have an entirely new situation to face. A basic change has been made to the structure of the industry. The regrouping of the gas, coal, and electrical industries under public ownership, and the declared intention of the Government to set up machinery for the co-ordination of the three industries brings into being a very different picture from that envisaged by the Coke Associations in their post-war planning.

Mr. Morrison, in the chapter on " Economic Socialization " in the official publication *The British Labour Party*, writes that by the socialization or nationalization of an industry or service the Labour Party means the vesting of the ownership of the physical assets in a public authority of some sort and the management of the industry or service in the public interest. The essential aims are better public service, greater efficiency and economy, and the well-being and dignity of the workers employed in the industry or service.

Mr. Gaitskell, in introducing the Gas Bill to the House, said that co-ordination of fuel and power had as its end the satisfaction of the consumers' needs for fuel and power at a minimum cost to the community. It sought to achieve this end by arranging the relations between the fuel and power industries, the scale of their activities and the purposes they serve so as to get the best results; that is, by getting a greater technical efficiency from coal due regard being paid to the costs of installation and equipment, labour charges, and smoke pollution. There was to be no dictation to consumers what fuel they should use and the stimulus of competition between the supplying industries was to be retained. Charges were to correspond to real costs.

Mr. Robens, later in the debate, said that it was essential that in any publicly owned enterprise having a monopoly of service there should be adequate safeguards for the protection of the consumer who was entitled to know that he was getting what he had paid for both in quantity and in quality. Machinery was to be established to allow the consumer to play his full part in the development of the supply service. During the Committee stage on the Bill, it was made clear that the Domestic and Industrial Coal Consumers Councils established under the Coal Industry Nationalization Act would be empowered to deal with gas coke produced for sale.

The Gas Act lays down that it shall be the duty of the Area Boards to develop and maintain the efficient, co-ordinated, and economical production of coke. They are also required to manufacture, treat, render saleable, supply or sell coke, and to reduce as far as possible its price. The Boards in each Area are also enjoined to consult with the N.C.B. with a view to the submission to the Minister of an agreed scheme for co-ordinating the carbonizing activities of the two Boards. Any such scheme may provide for co-ordinating arrangements for the marketing of the products of carbonization.

There is it. What do we make of it? We know that so far as coal utilization is concerned, carbonization gives the highest efficiency. As an industry we have been preaching it for years, and Colonel Carr underlined it in his Memorandum to the Prime Minister last November. But what does the rest all mean? Simply, I suggest, that we must get the most out of our coal and that the industry must be run in the interests of the consumer. Satisfactory working conditions must be maintained, revenue must balance outgoings, but the consumers' wants must be satisfied. He must be supplied with the type of coke best suited to his needs at a minimum cost to the community.

Essential Aims

These objectives, in my view, are completely reconcilable with the past work of the Gas Coke Associations. Their aims—improvement of coke quality, continuous development of methods of utilization, first-class consumer advisory service, and a uniform and country-wide marketing structure—are all essential to proper distribution of the product and in the best interests of the consumer. As a result of their efforts, consumer confidence has been gained and markets built up for the various classes of coke by steady and continuous service to the user. It has all cost money. Prices must be keyed to the costs of the preparing processes and alongside it all revenue must be maintained unless we are to go back to selling run of retort coke and so return to the jungle conditions of the late '20s. Future coke marketing must be based on making the best possible product we can—well suited to the consumers' needs, improving and perfecting our sales promotion and consumer service, and getting ahead of our competitors in methods of utilization and staying there.

The industry is a two-fuel industry. Let us face up to it and give the same sort of consideration to coke as is given to gas. We are going to have to sell coke in a highly competitive market and the responsibility for selling it is ours and ours alone. We must have a uniform price structure based on delivered prices and with zoned equalization of transport costs. It may have to be on a regional basis but it is essential that it should be national in conception. It is not going to be easy but the Federation report shows the way.

Coke markets must be cultivated and expanded. All possible applications and uses must be investigated and kept under constant review to develop whenever the occasion permits. Coke must be not sold or even regarded as a by-product or a residual. It should be marketed as a superior type of smokeless fuel which, when properly used by the consumer, is more efficient and more economic than other classes of solid fuels. Quality and good sizing, and uniformity of quality and sizing, are vital to our purpose. As a manufactured fuel, coke lends itself to specification. When present difficulties in the way of labour, plant and coal supplies permit, the industry should not hesitate to lay down and to publicize standards for coke coupled with trade marks or special designations as an open guarantee to the consumer that he can rely on the quality and the uniformity of the product and that he is being given full value for his money.

The industry must learn again to build up and to carry stocks to meet seasonal loads and when the stocks are being cleared the coke must be rescreened to size. Proper mechanical loading and weighing facilities must be established at each works or depot. As an industry we are largely dependent upon road transport. Well-planned schemes for loading of vehicles are essential for efficient delivery service.

We know that we are going to have to sell coke again and the time

for the passive taking of orders is past. Sales promotion and service to the consumer—really synonymous terms and practically non-existent under to-day's conditions—are now of paramount importance. The individual consumers' needs must be studied and, when wanted, sound advice given as to the type and size of coke best suited to his requirements and the most effective and economical way of using it. Facilities must be made available again in the domestic field for the easy and ready supply of approved coke burning appliances and this service should be extended to include coke stores, bins and hods. An expert consultation service must be provided for the industrial and the large buyer. The co-operation and the goodwill of the merchants and the independent distributors must be maintained and extended. Salesmen must be trained and the coke salesmen's discussion groups restarted.

The consumer must be educated. Publicity must be planned and be continuously and energetically perused nationally and regionally. Descriptive up-to-date booklets, brochures, and pamphlets should be prepared covering all sections of usage. Showrooms, exhibitions, films, and lectures must all play their part in providing a service to the consumer comparable to that already provided for gas.

Bound Up Together

The fortunes of the gas coke industry are largely bound up with those of the hard coke industry. The products of the two industries, dissimilar in some respects, have many common usages. Coke will always be competitive with coal, with electricity, with oil, and with other fuels, but experience has shown that there must always be some measure of co-ordination between gas coke and hard coke in the general industrial and domestic markets, and it is satisfactory to see that in the Gas Act provision is made for co-operation between the two industries.

How that co-operation is to be secured is perhaps outside the scope of this paper. Dr. Foxwell, in his paper last month to the Coke Oven Manager's Association, explored the possibilities in some detail and, incidentally, clearly revealed the weakness of some of the assumptions that have been made as to the possibilities of centralization of gas production near collieries with long-distance distribution of gas and coke over wide areas. The gas industry made a strong case for the coke ovens outside the iron and steel industry to be brought under the aegis of the nationalized gas industry. The Gas Act did not embody this suggestion. Nevertheless functionally the two industries, both as regards gas and coke, are really serving the same purpose. Obviously there is a common interest and there must be the closest relationship at both regional and national levels. I am satisfied from the experience we have already had with the National Coal Board and the other hard coke producers that this relationship will not be difficult to establish.

Nevertheless, we are still to have the stimulus of competition between the fuel and power industries and the centralization of the industries will do much to intensify and sharpen the edge of this rivalry. What we have attempted to do in the past is going to be much more important in the future under the new conditions. In the past the gas coke industry has always had to be flexible in mind and receptive to new ideas and we have no need to be afraid of the future if we are alive to the position. Our steps have been directed to these ends for many years but we must redouble our efforts if we are to retain our place.

Our greatest technical problems, at any rate in the immediate future, are coal quality and plant replacement, and they are vital. Are we all satisfied, though, that we are doing our absolute best with what we have got ?

DISCUSSION

The **Chairman** (Mr. W. K. Tate, Portsmouth) said that in preparing a programme for the new session of the Association, he had had a feeling that some of them did not appreciate to the full the important part played by coke marketing in the gas industry. Coke was a very important factor in the financial structure of the industry but one which, no doubt owing to the rationing of solid fuels, had perhaps tended to slip away from their day-to-day, intimate consideration. He had felt that it was most opportune to have an early paper on the subject of coke marketing, and who better was there to give it than Mr. Cooke ?

There were a number of very pertinent points in Mr. Cooke's paper, and a number of home truths which they ought to take very much to heart. There were two sentences which perhaps summed up the position as it stood to-day very briefly and clearly: " Nothing is more certain than that we are going to have to sell coke again instead of rationing it," and " It should be marketed as a superior type of smokeless fuel which, when properly used by the consumer, is more efficient and more economic than other classes of solid fuels." Two things concerned him. Firstly there was the price of coke to-day. As Mr. Cooke had said, the price of coke had got quite out of step with the price of coal for reasons over which they had no control. It had got gravely out of step with the pre-war position and yet the time might come fairly soon when the position might be very difficult for the gas industry. In the Portsmouth undertaking, the price of gas had increased by 72% since the war and the price of coke by 140%, notwithstanding the fact that coal had gone up 350%. The margin between coal and coke had not narrowed appreciably but as both had got more expensive so had the attraction of coal tended to increase. With a selective reduction in the price of coals which would immediately affect coke, there was very little manoeuvering space to balance revenues in the industry. This was a matter on which they ought to ponder very much.

Government Leaning Towards Single Solid Fuel

A second matter which concerned him was the leaning of Government Departments to a single type of solid fuel. They had had reports of all kinds, from the smokeless fuel point of view very encouraging documents, but the coke boiler, which was an excellent weapon and one which was not very fastidious about the fuel it consumed, appeared now to be unpopular. Whereas before they could deal with individual builders and consumers, they were now dealing with the Government or with Government-sponsored Departments dealing with housing. Various means were employed to make sure that local authorities put in their houses specific types of equipment, and those were open and closeable stoves which were much more selective in the type of fuel they consumed. That appeared to be a great problem because of the nature of the coals normally received by the gas industry. Their technical committees must watch that particular problem very closely and do all they could to make as broad as possible the type of coke-burning appliances which were installed.

Mr. **F. Dawson** (North Middlesex) congratulated Mr. Cooke on his paper. This was probably the first paper he had presented to any of the Associations and they were privileged to have received the honour and extremely grateful to him for reviewing the future of coke marketing so admirably. It was appropriate that they should have someone with authoritative knowledge outlining the activities of the industry under private enterprise and at the same time try to look into the future and to see what it was going to bring. As Mr. Cooke has said, it was rather like crystal-gazing but they had to scratch their heads and think about the future set-up and its best form. The more people thought about it, the better it would be.

One of the difficulties he saw arose from an inability to accept assurances that there would be free competition between fuels in the future. What was the relationship between the various nationalized fuel industries to be ? It was all very fine to talk about continuing competition but unfortunately when the industries were controlled by two or three boards, they would obviously often have a close relationship. He thought there would be actually some sort of pressure brought to bear on them to take certain action, which it was assumed would be to the benefit of the consumer but was not necessarily so.

The Export Market

The export market, too, would be of vital importance. It was not now, and he doubted if it would become, a free market: the Economic Commission for Europe would determine whether we could export or not. Previously exports had been the balancing factor in the market and had helped to avoid a big surplus and a consequent slump in prices. The export of most commodities was now controlled to some extent by the Government, and was most probably limited by political rather than economic matters. If the export market was controlled in this way it was bound to have a greater effect on the future marketing of coke in this country, particularly as the conditions arose which Mr. Cooke had foreseen and there became a surplus of coke oven coke.

One thing that had struck him in the paper was the reference to the list of Approved Appliances. They all agreed that the L.C.C.A. had done an extremely good job of work in producing the list. Strangely enough, on the gas side they had been pressing for years for such a list but had never got one: it was said to be completely impossible. It was strange that a list could not be prepared for gas appliances while one had already been issued in the newer coke sphere.

The Simon Report had been an advisory one which it was difficult for the Government to implement as it had no means for doing so. It could only make recommendations to local authorities, except possibly in the case of prefabricated housing where it had direct control. Otherwise it was only advisory and one was often up against a difficulty where authorities were tied down on what they could install in a house owing to rising costs of building. The Government probably agreed that they should adopt the Simon Report but they had no means of doing it.

Whatever the future, they would still have to sell coke and the time was rapidly drawing near when they would have to make intensive efforts to maintain their sales. During the war, the restrictions on solid fuels enabled them to get rid of coke quite easily and they had perhaps got into bad habits. It would certainly not be very much longer before they would have to exercise a tremendous amount of energy to sell their coke products.

Mr. **S. E. Whitehead** (Southampton) said that Mr. Cooke had produced a very valuable and timely paper, and with most of the points raised he was very much in agreement. It was a timely paper because they were very shortly going to be up against difficulties in selling coke.

Two things worried him. First there was the question of price: he was concerned about the discrimination shown by the National Coal Board about the difference between gas coal and domestic coal. This might be the thin end of the wedge. Secondly, they had to remember that coke would not burn satisfactorily in a coal grate. They must be very careful about that and must face the future as coke producers thinking on three lines: (i) price; (ii) the question of screening and grading; and (iii) moisture and ash content. Screening and grading was not altogether in their hands as most of them needed new plant, but that would be remedied in time. The question of moisture was largely in their own hands, though they could do nothing about ash content at the moment. They could only hope that all the talk about cleaner coal would be extended to gas coal: most of them were heartily ashamed of some of the stuff they had sent out as coke in the last few years. These and other matters had to be dealt with quickly if they were to keep the coke market, and they must be thankful that they had a good organization behind them. The organization was a tribute to the work of their old friend Robert W. Foot, whose tremendous work and plans were now showing their value to a greater and greater extent. They had the structure but whether it would be allowed to remain it was impossible to say. He was sure they all shared the hope that the Gas Council and Area Boards would maintain the structure and use it in the same way as at present. It would be a very great pity if the organization were scrapped.

Dr. G. E. Foxwell (Clayton, Son & Co., Ltd.) wondered if the meeting was not being over-worried about the position of coke in a nationalized industry. The Government had nationalized the industries, by its own admission, to make them more efficient and it would not do for an efficient industry to have a lot of coke lying about and never being sold. Whatever the position of the National Coal Board, in free competition or not, such arrangements had been made to enable all the coke made to be sold somewhere. There was no need to worry much unless the industries were really going to be open to free competition, as he did not think they really could. Even the Minister of Fuel and Power was coming round to the view that we must have a national fuel policy in which every type of fuel would be used.

Nothing to Fear from Coke Ovens

He did not think there was any need to fear competition from coke ovens for years. The present position was that the iron and steel industry wanted every ounce of coke it could get. The iron and steel industry was being expanded but only one big battery of new coke ovens was going up at present. More would be built but the chief informed opinion was that up to 75% of the coke needed would be made in their own ovens, leaving 2 or 3 mill. tons a year to be produced by other ovens, which could be owned by the gas industry if it wished. He rather felt that future development in the coal fields might be for coal to be carbonized in the towns instead of at the pithead. Then the gas and coke would continue to be produced which could be used by the iron and steel industry. The danger was that the iron and steel industry would be producing 75% of its needs, and producing it all the time. As soon as they ran into a bad period they would leave the extra 2 or 3 mill. tons floating. They were getting to this position: that in the modern world the market of anything produced in any quantity had to be organized. The Socialist Government, which for years had been complaining about trusts and cartels, had now come to the conclusion that it must have vast cartels of its own, irrespective of what the public wanted.

The oil position was rather less hopeful than Mr. Cooke made out. It had been found that fuel oil was much better for some furnaces, particularly open hearth furnaces, than coke oven gas and blast furnace gas. Its high flame temperature and other characteristics permitted furnaces to be operated at greater production rates which was very important. At the plant he had mentioned in Wales they were putting in oil-burning furnaces entirely, so that the coke oven gas which was surplus could be used in a gas grid. Oil refining capacity now being installed was such that this country would be able to refine 20 mill. tons of oil a year, and all of it would probably be used here. As the new plant came into production there would be more fuel oil available.

All-Purpose Appliances

Some doubts had been expressed about the leanings of Government Departments to all-purpose appliances. The position was that the Government was anxious that there should be smokeless appliances installed, referring to them as " Approved Appliances," because houses going up in large numbers wanted smokeless fuels for winter seasonal purposes, for which the gas industry could not produce all the load at economic prices. The Simon Committee reported that anthracite and smokeless coals were the main fuels but now the Government said that we wanted those for export. It had now been agreed that for some years to come, until sufficient carbonizing plant was available, it had to remain possible to use ordinary bituminous coal. Rather regretfully, approved appliances were being licensed which would burn anything, but a bituminous coal very much less smokelessly. As the coal situation improved, it was hoped that consumers will turn over to smokeless fuels. Therein was an important point: it had been said that a free choice between fuels must be allowed to the consumer. If there was to be free choice, the fuel that was in demand must be produced, and there were very few consumers who really thought that coke was better than bituminous coal or anthracite. It was a challenge to the gas industry which the Coke Association had carefully refrained from giving, that they must produce a better coke not only in ash content and free-burning qualities, one the housewife could use just as well as she used her present fuels.

Dr. F. J. Eaton (Gas Light and Coke Company) said that the best coke markets had been built up on the policy of suiting the appliances to the coke, a policy which had paid the gas industry. Dr. Foxwell had mentioned the question of quality control and, apart from the matter of ash which was a very serious one at the present time, the burning properties of gas cokes were suited to the appliances which we now had in different markets. There was, too, the question of moisture control but that was within their own control and could be attended to when plant could be repaired and put in order, so as to return to the moisture content standard of before the war.

Much had been said about the Approved List of Appliances which was based on standards identical with those of the Ministry of Fuel and Power. That was not to say that all the appliances on the Coke Association's list were the same as those on the Ministry's, because the Ministry list naturally had to include appliances which were entirely coal burning. These had been produced in the past and would have to be used until such time as there were sufficient appliances of a type burning all solid fuels; they were also required in areas of the country in which coke was not available. A close link between the National Federation of Gas Coke Associations and the Ministry of Fuel and Power prevented overlapping in the approval of appliances, co-operation going to the extent of exchanging test results. All these approved appliances were tested on gas coke and bituminous coal, and the standards, not yet published though fairly well-known, were such that the efficiency on gas coke was required to be greater than that for bituminous coal.

Advantages of Grading

The development of our coke markets and the increase in price the industry had been able to command dated from the time when they first weighed their coke, about the 1920s. This development had proceeded and now practically every gas-works had coke-grading plant but they did not all produce the same range of sizes. During the war the Institution of Gas Engineers appointed a committee to look into the question of coke control which recommended that the L.C.C.A. sizes should be adopted for the whole of the country. From his own knowledge that was not so: one found that in certain parts of the country only one size was being produced, ¾ in. to 2 in., the rest being sold as breeze or, in the larger sizes, as steam-raising coke. Appliance designers could not be expected to produce appliances which would give maximum efficiency on different sizes of coke up and down the country. All producers should look into the question of the sizes they were now making and see whether each was absolutely essential for their own markets. The amount of coke depended, of course, on the amount of coke made and it was essential for managers and engineers to sell their product in the best possible market. Coke had to be sold quickly, too—it was an expensive business putting it down on the ground and picking it up again. Each company had developed its own market.

It appeared that up to now, most of our houses had been of a type for which an intermittent burning device had been able to supply most of the heat for a dwelling. The development which was going on now, which might be rather slow, was in the direction of whole-house heating. It would be found that the domestic boiler would then come back into its own, but not in the form it had to-day. As far as appliances were concerned there had been a big change in the attitude of the builder and local authorities in the price they are prepared to pay—to-day they would pay more for a better article.

The open fire was fairly sensitive to coke quality in the direction of ash. If it was present in the form of slate it did not matter very much but if it was effluent ash the radiation dropped off fairly sharply. In a stove it was possible to use a widely different range of sizes, and the managers must arrange their markets to use the different sizes which were naturally present.

" Programming " and Salesmanship

Mr. G. G. Champion (Gas Light and Coke Company) said the whole of the relationship between large and broken nuts had to be re-organized, a thing that managements as a whole were not going to like. At present the greatest competitor of coke was gas, and as long as " programming " continued it was no use going to a customer and offering him 1,000 tons of coke, then next year telling him he could not have it because the " programme " had been altered. While " programming " lasted, salesmanship would not be anything of the art it used to be.

Mr. F. S. Evans (South Metropolitan Gas Company) thought that if the gas industry was to look forward to future competition in its coke markets, there were three essentials. First, a proper competitive price for coke had to be maintained; second, a quality that the consumer could feel assured about; and third, the maintenance of appliances, and consumer service to the greatest extent.

No doubt mechanical firing had to come, and very quickly with coke, but there were a lot of difficulties. They knew how to get the coke burnt 20 years ago but now they were up against the price. Mr. Cooke had very rightly discussed the troubles with breeze and they had learnt to burn coke dust on chain grates, while in the electricity industry they were using breeze with a high percentage of fines mixed with coal without getting "birds-nesting." It looked as though there might be an opportunity for the sale of fine breeze on a basis perhaps not directly related to the calorific value. If a market could be found for fine breeze, surely one could be found for screened breeze. He had a very great faith in the future of the coke industry.

Mr. **E. W. Bennett** (Gas Light & Coke Company) said the price which speakers had mentioned was that for a ton of coke, but the important price was that per ton of coal. If breeze could be upgraded into coke from 20% to 10 or 12% they would be meeting a good many of their difficulties. If the lower sizes of shale and hard coal were put through a grinding mill and fed back into the carbonizing unit, revenue would be improved and the size now required to be sold into the domestic market would be reduced, one which that market was not always anxious to take. The industry should make a stronger coke, getting many benefits from that procedure. Excess Profits Tax had been an important factor in the sale or lack of sales of coke in recent years because however desirable coke was made to seem to the buyer of large amounts he, being more worried with problems of labour, would prefer anthracite or coal and draw the difference from his E.P.T.

Mr. **L. Smith** (Gas Light and Coke Company) said that publicity for coke in 1938-39 had been too far in advance of the efficiency of coke plants that there was a definite time-lag between publicity and performance. They must be careful that their publicity was not too advanced, and it seemed likely that publicity might be affected by permission to programme any quantities whatever on to the market.

The Author's Reply

Replying, Mr. **Cooke** said that every statement he had seen by the Minister of Fuel and Power and others had emphasized that competition between all fuels was going to continue, meaning that we would have three nationalized industries competing with each other. Obviously that would mean them making arrangements in some directions but the degree of this was likely to be circumscribed by the Minister as far as he was able to do. The Minister would ensure that the consumer got an absolutely competitive price. So far as appliances were concerned, Dr. Eaton had dealt with most points but he believed, in regard to new housing, that 20 open fires or closed stoves were being put in to-day for every domestic boiler. That might very much interfere with the balance between nuts and broken coke. The open fire using a large size of coke was going to be a good deal more selective than the old domestic boiler. So far as present prices were concerned, it was everyone's knowledge that they had more than held their ground with hard coke but with anthracite and dry steam coke they were very much worse off than in 1939. The position might be remedied but the present time was hardly one for making any definite change in price structure and there might be adjustments made to the prices of some of the fuels which at the moment were a little too competitive for their liking. The National Coal Board were looking for revenue and those coals which sold easily were going to be regarded as channels for it. The price of bituminous coal was much more important to the coke producers because the total quantity of smokeless fuel sold was so very small a percentage. That was particularly true in the domestic field and was true even in London where higher percentages of smokeless fuel were sold than in any other part of the country.

The exports position was not quite so much one of planning as of supplies to meet the very real shortage. Britain was not the only country working on maximum iron and steel production and there was just as much restriction in the usage of hard coke on the Continent as here. That was leaving gaps in the domestic market for some time to come which the gas industry was quite fitted to fill.

With regard to the adoption of appliances by local authorities, it was part of the general scheme that the authorities had to use approved appliances in their specifications before they could qualify for house-building grants. Otherwise they had to show good reason why the use of approved appliances was not possible.

On one side they were being swamped by appeals for markets for coke and there was a big future in the domestic business, though he was not sure that they were on "all-fours" with the merchants.

Mr. **E. O. Rose** (Tottenham) proposed a vote of thanks to Mr. Cooke for his paper. The proposal was seconded by Mr. **J. W. Townsend** (Tunbridge Wells), who remarked that the snag about coke was that there was no cost of production and price could therefore only be based on that of coal.

INSTITUTION EDUCATION SCHEME
RESULTS OF 1948 EXAMINATIONS

THE undermentioned candidates were successful in the 1948 Examinations in Gas Engineering (Manufacture) and Gas Engineering (Supply) of the Institution of Gas Engineers, held under the Education Regulations of the Institution.

Annual Examinations

EXTERNAL CANDIDATES (76)

Diploma in Gas Engineering (Manufacture) (6)

Class	Name	Undertaking
First	Hamshaw, M.	Glossop
Second	Brown, W.	Falkirk
,,	Carpenter, T.	Hereford
,,	Crane, K. J.	Shrewsbury
,,	Lomax, J.	Otley
,,	Marshall, J. C.	Londonderry

Higher Grade Certificate in Gas Engineering (Manufacture) (22)

Class	Name	Town
First	Hoyle, Norman	Peterborough
Second	Annable, G.	Horley
,,	Banyard, C. W.	Lincoln
,,	Bottomley, R.	Bedford
,,	Burbridge, J.	Leeds
,,	Campbell, J.	Romford
,,	Clarke, P. R.	Cambridge
,,	Cookson, C. G.	Stourbridge
,,	Crick, G. C. G.	Newton Abbot
,,	Geall, D. G.	Brighton
,,	Higgs, F. C.	Swindon
,,	Hodgson, R.	Bradford
,,	Hollingshead, C. R.	Liverpool
,,	Johnston, W. McM.	Hereford
,,	Lawler, E. S.	Slough
,,	Lowis, J. B.	Oxford
,,	Mitchell, R. B.	Prescot
,,	Ogden, K. G.	Doncaster
,,	Reber, J. R.	Baden, Switzerland
,,	Richards, R. O.	Cobham
,,	Wellington, M.	Port Talbot
,,	Wilson, B. E.	Loughborough

Ordinary Grade Certificate in Gas Engineering (Manufacture) (20)

Class	Name	Town
First	Hobbs, H.	Swindon
,,	Wilson, N. D.	Perth
Second	Bartlett, R. G.	Paignton
,,	Beattie, W. S.	Belfast
,,	Croysdale, J. H.	Frimley
,,	Farmer, G. C.	London, N.12
,,	Leaver, N.	Wallasey
,,	Lewis, D.	Pembroke Dock
Second	Lodge, B. A.	Selby
,,	Marshall, A. C.	Cheshunt
,,	Norris, D. V.	Swindon
,,	Peters, W. J.	Hove
,,	Scantlebury, F. T.	Plymouth
,,	Sedgwick, L.	Billingham
,,	Simpson, D. G.	St. Albans
,,	Skinner, S. N.	Croydon
,,	Stalker, A. K.	Sunderland
,,	Styles, P. A. W.	Southampton
,,	Twomlow, W. H.	Tamworth
,,	Wilson, W. Y.	West Ferry

Higher Grade Certificate in Gas Engineering (Supply) (8)

Class	Name	Town
Second	Atkin, R. J.	Stretford
,,	Bacon, J. F.	Beeston
,,	King, F. H.	Stockport
,,	Moorley, T. E.	Oxford
,,	Oliver, F. P.	Hawick
,,	Talbot, T. H.	Tipton
,,	Winterburn, A. G.	Barnet
,,	Woodcock, J.	Colwyn Bay

Ordinary Grade Certificate in Gas Engineering (Supply) (19)

Class	Name	Town
First	Forbes, P. C.	London, N.13
,,	Parker, J.	Bristol
,,	Sullivan, K.	Liverpool
,,	Ward, L.	Leeds
Second	Beardshaw, W. E.	Cambridge
,,	Chitty, C. F.	Swindon
,,	Duxbury, A. D.	Leeds
,,	Edwards, W. J.	Oxford
,,	Hall, G.	Bristol
,,	Howard, M. L.	Preston
,,	Kent, C.	Paignton
,,	Le Caudey, M. J. T.	Jersey
,,	Mathews, A.	Halifax
,,	Mercer, F. G.	Lancaster
,,	Middleton, G. J.	Cambridge
,,	Nicholson, D. A.	London, S.E.27
,,	Smyth, C. S.	Aberdeen
,,	Taylor, F. S.	Castleford
,,	Workman, R.	Leeds

Ordinary Grade (Single Subject) Examination in Gas Engineering (Supply) to qualify to sit for the Diploma in Gas Engineering (Manufacture) (1)

Class	Name	Town
First	Beale, E. W.	Birkenhead

INTERNAL CANDIDATES (219)

Higher Grade Certificate in Gas Engineering (Manufacture) (42)

Class	Name	Centre	Town
Second	Aitken, E. J.	Cambridge	Dundee
,,	Barker, J. B.	Bradford	Perth
,,	Bignell, V. A. T.	Cambridge	Farnborough
,,	Bown, C. P.	Leicester	—
,,	Bradley, A.	Cambridge	Bury
,,	Briggs, A. B.	Edinburgh	—
,,	Briggs, E. E.	Burnley	—
,,	Briggs, R. D.	Cambridge	Eden Bridge
,,	Buttery, R. V.	Brighton	Birmingham
,,	Campbell, J. D.	Edinburgh	—
,,	Clegg, E. B.	Manchester	—
,,	Cole, G. F.	Birmingham	—
,,	Daniell, L. J.	Brighton	London, S.W.18
,,	Diggins, N.	Burnley	—
,,	Donaldson, K. S.	Cambridge	Hull
,,	Francis, R. T.	Cambridge	Wrexham
,,	Gadd, J.	Cambridge	Dunstable
,,	Halstead, C.	Burnley	—
,,	Hartill, I. J.	Manchester	—
,,	Heaton, H. L.	Manchester	—
,,	Hendry, J.	Cambridge	Paisley
,,	Ingham, W. S.	Burnley	—
,,	Jerman, D. R. S.	Brighton	London, S.W.15
,,	Johnson, H.	Manchester	—
,,	Maych, L. B.	Manchester	—
,,	Maxey, C. L.	Cambridge	Grantham
,,	Mills, C. E.	Manchester	—
,,	Nosworthy, S. E. J.	Plymouth	—
,,	O'Shea, J. W.	Leicester	—
,,	Parry, H.	Brighton	Holyhead
,,	Piggins, H. B.	Blackpool	—
,,	Robinson, H. C.	Cambridge	Cleethorpes
,,	Sauto, B.	Cambridge	Lostwithiel
,,	Sharp, J.	Cambridge	Bradford
,,	Sharpe, R. M.	Brighton	Boston
,,	Shepherd, N. W.	Cambridge	Manchester
,,	Snow, F. P. N.	Brighton	Birmingham
,,	Swan, P. L.	Cambridge	Cambridge
,,	Tomkins, R. H. R.	Brighton	Hereford
,,	Watson, J.	Brighton	Dundee
,,	Weston, R. G.	Brighton	Chelmsford
,,	Wilkinson, G.	Manchester	—

Ordinary Grade Certificate in Gas Engineering (Manufacture) (42)

Class	Name	Centre	Town
First	Roberts, A. N.	Gloucester	—
,,	Sullivan, K.	Wigan	—
,,	Williams, E. S.	Gloucester	—
Second	Adams, D. R.	Edinburgh	—
,,	Boardman, C. H.	Rotherham	—
,,	Bradbury, I.	Manchester	—
,,	Burbridge, J.	Leeds	—
,,	Downes, D.	Westminster	London, S.W.16
,,	Drabble, J. S.	Sheffield	—
,,	Gray, J. S.	Glasgow	—
,,	Halder, N. A.	Rotherham	—
,,	Hardman, F.	Manchester	—
,,	Henrys, R. E.	Westminster	—
,,	Herbert, L. S.	Westminster	—
,,	Hill, F. L.	Westminster	—
,,	Hudson, K. J.	Manchester	—
,,	Jackson, A. MacD.	Glasgow	—
,,	Jepson, J. A.	Manchester	—
,,	Julian, J.	Cardiff	—
,,	Jones, E. B. R.	Manchester	—
,,	Lewis, J. T.	Newcastle-upon-Tyne	—
,,	McBride, W. W. S.	Glasgow	—
,,	Maclean, D. I.	Edinburgh	—
,,	McHugh, A.	Glasgow	—
,,	Malcolm, A.	Glasgow	—
,,	Mason, R. T.	Huddersfield	—
,,	Murray, J. T.	Dundee	—
,,	Parson, I.	Westminster	—
,,	Rhodes, R. P.	Westminster	—
,,	Rimmer, J.	Wigan	—
,,	Saggers, R. F. E.	Westminster	—
,,	Scott, W.	Glasgow	—
,,	Seed, J. W.	Rotherham	—
,,	Sherratt, B. W.	Manchester	—
,,	Stanton, F. C. S.	Westminster	—
,,	Townsend, C. C.	Gloucester	—
,,	Walker, G. O.	Huddersfield	—
,,	Webster, J. T.	Dundee	—
,,	Whitmill, P. A.	Leicester	—
,,	Wixey, H. P.	Gloucester	—
,,	Yeaman, A. G. D.	Birmingham	—
,,	York, E. J.	Bristol	—

Ordinary Grade (Single Subject) Examination in Gas Engineering (Manufacture) to qualify to sit for the Diploma in Gas Engineering (Supply) (1)

Class	Name	Centre	Town
First	Knowles, A. E.	Rotherham	—

Higher Grade Certificate in Gas Engineering (Supply) (44)

Class	Name	Centre	Town
First	Boys, H. W.	Brighton	Worthing
,,	Dewhirst, G. M.	Brighton	Keighley
,,	Emmony, R. O.	Brighton	Nottingham
,,	*Hammond, D. H. P.	Brighton	Brighton
,,	Marfleet, S.	Bradford	Tottenham
,,	Mason, A. D.	Brighton	Haltwhistle
,,	Partington, C. G.	Bradford	Flixton
,,	Spencer, D. A.	Westminster	—
,,	Thrupp, T. H.	Brighton	Stourbridge
,,	Wilson, J. W.	Brighton	Leeds
Second	Anderegg, E. T.	Bradford	Waltham Cross
,,	Arnold, J. E.	Huddersfield	—
,,	Blacker, R. J.	Brighton	Bath
,,	Bradfield, R.	Westminster	—
,,	Bunker, P. J.	Brighton	Brighton
,,	Button, B.	Westminster	—
,,	Carder, W. H.	Westminster	—
,,	Coles, L. J.	Westminster	—
,,	Doran, J. F.	Westminster	—
,,	Dunn, F. J.	Westminster	—
,,	Forrest, E.	Westminster	—
,,	Goodwin, G. H.	Bradford	Beverley
,,	Hollingsworth, K. F.	Birmingham	—
,,	Illingworth, G. F.	Huddersfield	—
,,	Knight, B. R.	Brighton	Southwick
,,	Knight, F. E.	Brighton	Bournemouth
,,	Laycock K. E.	Bradford	—
,,	McClennan, D. W.	Birmingham	Newcastle-upon-Tyne
,,	Macnair-Kay, A.	Westminster	—
,,	Marsh, R.	Brighton	Bromsgrove
,,	Mather, L. R.	Bradford	—
,,	Mays, P. H.	Westminster	—
,,	Mills, P. J.	Bradford	London, N.4
,,	O'Connor, A. T.	Bradford	Wellingborough
,,	Parker, F.	Bradford	—
,,	Perriss, S.	Westminster	—
,,	Robertshaw, G. W.	Derby	—
,,	Skinner, L. F.	Bradford	London, N.22
,,	Taylor, D. V.	Brighton	Surbiton
,,	Tubman, E. J.	Westminster	—
,,	Walker, A.	Glasgow	—
,,	Walker, J. M.	Bradford	Dundee
,,	Watts, H.	Westminster	—
,,	Woods, A. H.	Brighton	Kettering

Ordinary Grade Certificate in Gas Engineering (Supply) (63)

Class	Name	Centre
First	Blowers, K. A.	Westminster
,,	Evans, J. E.	Westminster
,,	Harris, R. C.	Westminster
,,	Jordan, F. H.	Westminster
,,	Ling, C. H.	Newcastle-upon-Tyne
,,	Mitchell, A. R.	Newcastle-upon-Tyne
,,	Mitchell, W. E.	Birmingham
,,	Preston, R.	Bradford
,,	Prothero, A. T.	Westminster
,,	Wilks, H. E.	Westminster
Second	Adams, D. R.	Edinburgh
,,	Belcher, R.	Stoke-on-Trent
,,	Bentley, N.	Bradford
,,	Bish, T. C. S.	Westminster
,,	Brew, C. M.	Westminster
,,	Burrows, V. K.	Newcastle-upon-Tyne
,,	Cameron, D. S. A.	Westminster
,,	Campbell, G.	Edinburgh
,,	Cawte, F. R.	East Ham
,,	Clarke, J. H.	Westminster
,,	Clarke, K.	Burnley
,,	Coombes, A. J.	Westminster
,,	Crowley, J. E.	East Ham
,,	Dalby, H. O.	Westminster
,,	Davies, G. S.	Westminster
,,	Eales, R.	Westminster
,,	Elliott, W. R.	Newcastle-upon-Tyne
,,	Elsby, A. F.	Stoke-on-Trent
,,	Forder, F. C.	Westminster
,,	Foster, W.	Westminster
,,	Fotherby, C. B.	Newcastle-upon-Tyne
,,	Gillett, M.	Bristol
,,	Goodson, F. T.	Westminster
,,	Greene, J. D.	Westminster
,,	Harvie, R. J.	Westminster
,,	Holland, A. E.	East Ham
,,	Jacques, G. H.	Birmingham
,,	Lanchbery, R. A.	Westminster
,,	Lewis, B.	Westminster
,,	Leys, C. W.	Cardiff
,,	Mann, J. S.	Westminster
,,	Matkin, R.	Derby
,,	Milan, J. H.	East Ham
,,	Moore, D. E.	Glasgow
,,	O'Reilly, M. J. D.	East Ham
,,	Pearne, S. P. L.	Westminster
,,	Plumley, V. A.	Westminster
,,	Pockett, H. E. J.	Cheltenham
,,	Pope, C. J.	Cardiff
,,	Rush, F. A.	Derby
,,	Savage, A. W. F.	Birmingham
,,	Scott, W.	Glasgow
,,	Simmonds, J. S.	Westminster
,,	Smith, D. S.	Westminster
,,	Sykes, E.	Huddersfield
,,	Taylor, R. S.	Newcastle-upon-Tyne
,,	Thorley, G.	Bradford
,,	Tibbles, A. J.	Cheltenham
,,	Watts, F. H.	Cheltenham
,,	Westwood, F. A. G.	Cardiff
,,	Willett, A. J.	East Ham
,,	Windsor, H. J.	Westminster
,,	Witton, L. C. A.	Birmingham

Ordinary Grade (Single Subject) Examination in Gas Engineering (Supply) to qualify to sit for the Diploma in Gas Engineering (Manufacture) (5)

Class	Name	Centre
First	Belton, J. F.	Birmingham
,,	Chignell, P. A.	Westminster
,,	Morris, J. E.	Birmingham
,,	Slater, L.	Manchester
,,	Wood, H. A.	Newcastle-upon-Tyne

Supplementary Examinations

Results of supplementary examinations held in July, 1948, for internal students attending intensive full-time courses in Higher Grade Gas Engineering (Manufacture) and (Supply):

Higher Grade Certificate in Gas Engineering (Manufacture) (12)

Class	Name	Centre	Town
First	Hill, R. A.	Birmingham	Bournemouth
Second	Abraham, H. G. ...	Birmingham	Birmingham
,,	Capewell, F.	Birmingham	Birmingham
,,	Chancellor, V. E. ...	Birmingham	Manchester
,,	Dobson, W. E. ...	Birmingham	Coventry
,,	Edwards, K. R. ...	Birmingham	Exeter
,,	Flux, D. T.	Birmingham	Shanklin
,,	Gardner, C.	Birmingham	Farnworth
,,	Male, W. L.	Birmingham	Northumberland
,,	Port, S.	Birmingham	Torquay
,,	Sweet, W. S.	Birmingham	Sunningdale
,,	White, L. F.	Birmingham	Aberystwyth

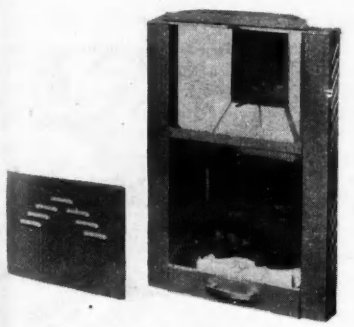
Higher Grade Certificate in Gas Engineering (Supply) (10)

Class	Name	Centre	Town
First	Price, J.	Birmingham	Coventry
,,	Sharrock, R.	Birmingham	Prescot
,,	Williams, J. P. ...	Birmingham	Cardiff
Second	Breeze, H.	Birmingham	Wallasey
,,	Coull, W.	Birmingham	Buckie
,,	Cross, D.	Birmingham	Coventry
,,	Farr, E. W.	Birmingham	Coventry
,,	Kirby, L. E.	Birmingham	Brighouse
,,	Lane, R. W.	Birmingham	Cannock
,,	Wells, R.	Birmingham	London, E.3

* Denotes First Class Pass with Distinction in the Main Subject Examination.

The Green "Stand-In" Fire

A new addition to the range of house warming appliances was recently demonstrated at the Leatherhead showrooms of the Wandsworth and District Gas Company. The Green "Stand-In" fire burns equally well with coal, coke, anthracite briquettes, or any other solid fuel. Fuel economy has been to the fore for a long time, and it is likely to remain so for a good many years, and the British Coal Utilization Research Association have, for many months, been trying to find a solution to the present fuel shortage. They have now succeeded in developing an inexpensive fire unit which burns efficiently with practically any type of fuel and which can easily be installed by the householder himself in practically any type of open fireplace. In the "Stand-In" fire, which was designed by Mr. J. S. Hales and Mr. T. W. Grieve, the radiant-heat output of the ordinary stool grate is supplemented by the provision of convection heating, while



excessive room draughts and their associated heat losses are eliminated by diminishing the number of air changes per hour. It has been found that, when burning bituminous coal, the "Stand-In" fire has a total thermal efficiency (radiation plus convection) of 37%, compared with 25% for a typical stool-bottom grate, while the number of air changes is only one per hour, compared with three to five for the ordinary open fire. When burning coke the overall efficiency of the appliance was increased to 48%, again with a rate of air change of the order of one per hour.

Fabricated from aluminium and finished in pastel shades, the fire adds to the appearance of any room. But although it has the new look the "blaze" is intensified by angled reflectors.

In the course of his remarks at the luncheon following the demonstration, Dr. D. T. A. Townend, Director General of B.C.U.R.A., said that the Association confines its activities to the development of methods and principles, leaving the manufacturer to produce the finished article. In the present instance Mr. Edward Green had come forward and had improved B.C.U.R.A.'s design, so that it was attractive to the housewife and applicable to mass production. There was no doubt as to the suitability of sheet aluminium; tests on this material had been carried out over 12 months. Replying, Mr. Green said the use of aluminium by the designers was particularly ingenious owing to the short supply of iron and steel. B.C.U.R.A. had brought out a solid fuel fire which would operate effectively on the present fuel ration and was within the reach of everyone, and if 10% of the present open fireplaces in the country were converted to the "Stand-In" design something like 500,000 tons of coal would be saved annually.

COMPANY NEWS

Powell Duffryn, Ltd.

The report and accounts for the year ended Mar. 31 show that the Directors have retained in the accounts of subsidiary companies a substantial part of the profits earned by those companies, but they have brought into the accounts of the parent company sufficient to enable them to pay a final dividend of 5%, making 8% for the year on the Ordinary capital. The consolidated profit and loss appropriation account shows that the consolidated balance to be carried forward is £2,241,709, against £1,866,142 brought in.

Stephenson Clarke, Ltd.

The consolidated profit and loss appropriation account for the year ended Mar. 31 shows that two interim dividends (7½% and 12½%) have been paid on Ordinary shares and no further distribution in respect of that year is proposed. Balances to be carried forward amount to £925,210, against £597,073 brought in. In January the 38,000 railway wagons of a wholly-owned subsidiary were acquired by the Transport Commission; compensation in the form of Transport Stock was received and subsequently sold, the net proceeds being somewhat in excess of £3,500,000. Diminution in earning power has caused the Directors to decide on a reorganization of the capital structure of the Company, and the necessary meetings to consider the proposals will be held as soon as the leave of the Court can be obtained. The whole scheme will be subject to the subsequent sanction of the Court.

George Wilson Gas Meters, Ltd.

Profit for the year ended Mar. 31 amounted to £20,255, compared with £39,658 for the previous year. The comparative decrease in trading profits was foreshadowed in last year's report, when it was mentioned that a substantial proportion of the profits had resulted from Government contracts. The year under review saw a complete return to the meter trade, and in view of an inevitable measure of dislocation resulting from the removal of part of the Company's productive capacity to the Bede Estate, Jarrow, during the year, the Directors do not regard the trading result as unsatisfactory. A dividend of 15% leaves a balance of £5,787 to be carried forward, against £5,892 brought in. Value of stock and work in progress appears in the balance sheet at £129,670, against £66,996 a year previously. The report explains that the position regarding supplies of materials made it desirable that the Company should build up maximum stocks for the purpose of maintaining a steady flow of production, while the quantity of partly finished meters and components was inevitably increased owing to intermittent shortages of certain specific items required for their completion. The report adds: "A disheartening trend of trade has been caused through the cut imposed by the Government on the building programme, and also through the imminence of nationalization of the gas industry."

GAS STOCKS AND SHARES

Firmness in industrial shares, with a shortage of stock which is said to be becoming pronounced contributing to a rise in prices, was the main feature of a steady week in the Stock Exchange. In the gilt-edged market leading dealers reported that conditions were slack, attributing the few small improvements to final adjustments to the new British Electricity loan terms. This new issue was announced on Oct. 20, the British Electricity Authority asking for £100 mill. in 3% Guaranteed Stock, 1974-77, at a price of 99½. The main part of the proceeds of the issue, which under the Electricity Act, 1947, carries Treasury guarantee as to principal and interest, it was stated, "will be applied towards financing capital developments already in hand." The programme includes "the construction of 25 new power stations and 50 major extensions of existing stations, additions to the Authority's main transmission system and extensions by Area Boards of their distribution systems to provide supplies of electricity for essential industrial and priority non-industrial purposes including new housing schemes and food production." The list opened and closed on Oct. 21.

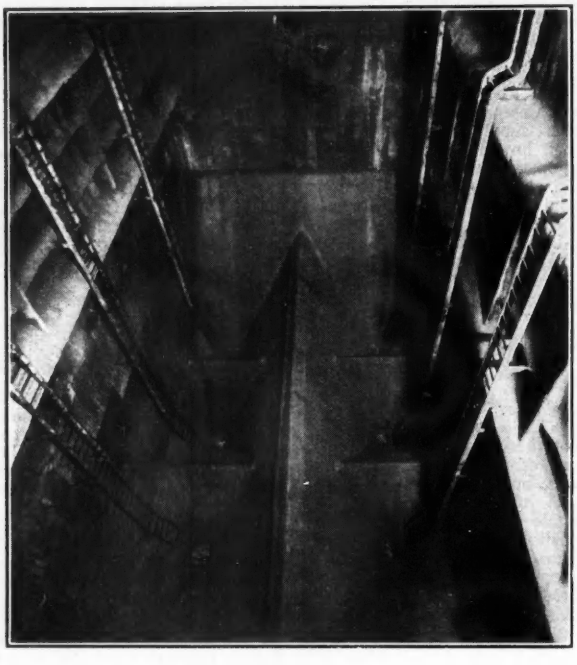
"Markings" were at their highest on Oct. 18, with 8,647 dealings recorded. Gas dealings totalled 239, compared with 202 and 226 in the previous two weeks. The week's official price changes were as follows:

OFFICIAL LIST

Cheltenham 5 p.c. basic cons. ord.	102 — 107	+	2
Primitive Holdings, Ltd. ord. ...	9/6 — 11/6	+	6d.
South Metropolitan, ord ...	99 — 102	+	2
Wandsworth, cons.	118 — 123	+	1

Evidence against coal smoke is presented in *Guilty Chimneys*, published by the National Smoke Abatement Society, Chandos House, Buckingham Gate, London, S.W.1, price 1s. Subtitled "The Evidence of Authorities Against Smoke," it contains over a hundred quotations, statistics, and extracts from official reports. The indictment is driven home by photographs and a centre-fold of coloured maps and diagrams demonstrating the argument graphically.

Gunite is PROTECTION against abrasion



Gunite—concrete applied by air pressure—has numerous applications where its great density and extreme adhesion have particular value.

For lining coal bunkers and steel chimneys it is an ideal material, possessing great resistance to corrosion and protecting steel-work from the abrasive action of the raw coal.

For repairing reinforced concrete it has particular merit, as, due to the method of application, a uniform density and adherence is obtained in whatever place the Gunite is applied, thus overcoming the common fault with hand-placed methods

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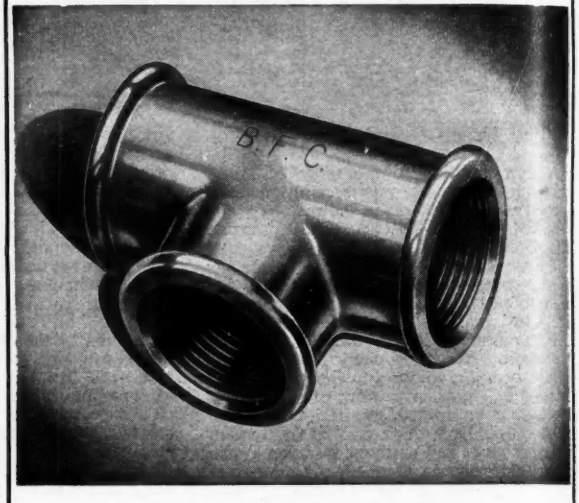

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